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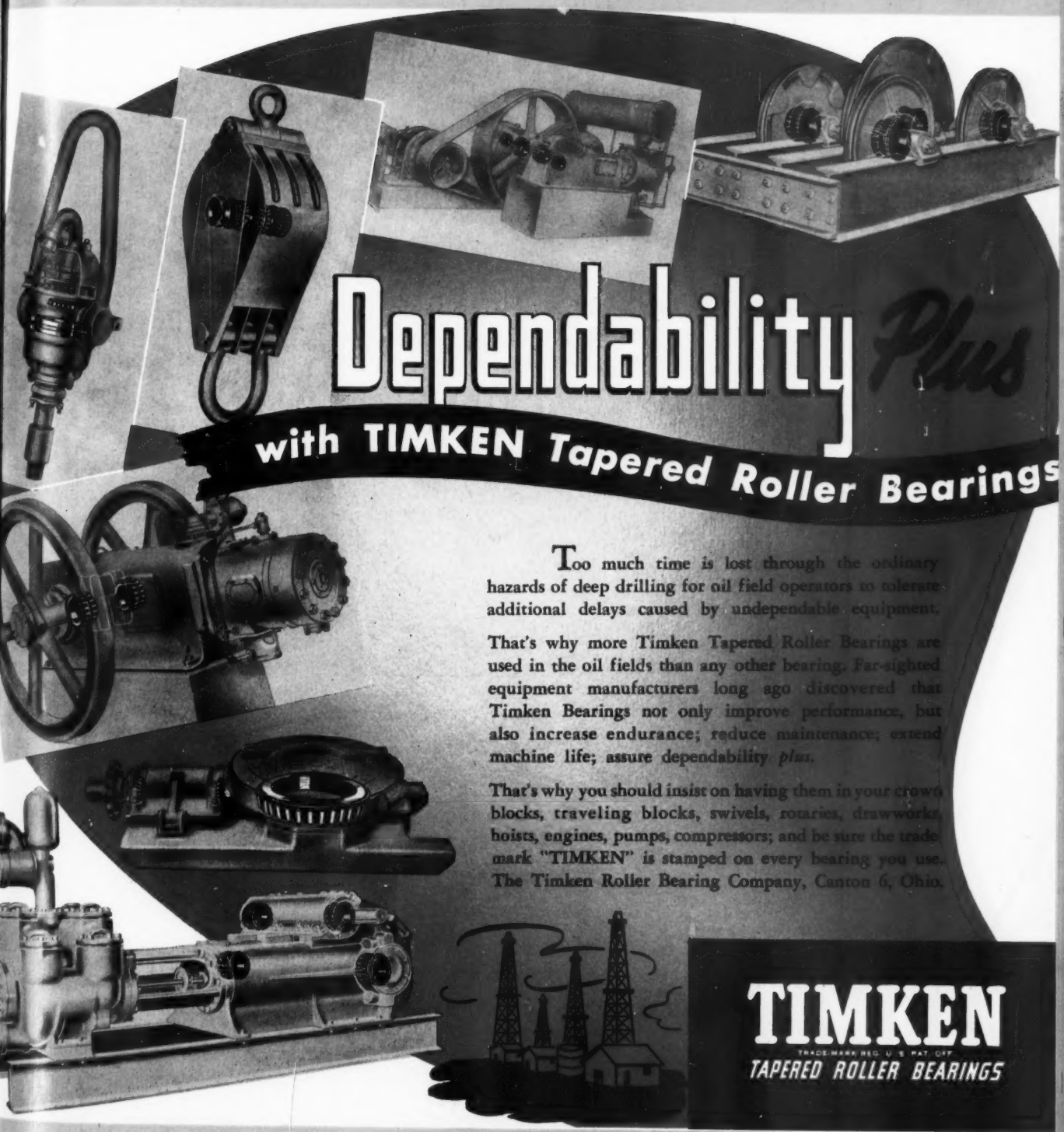
the OIL AND GAS JOURNAL



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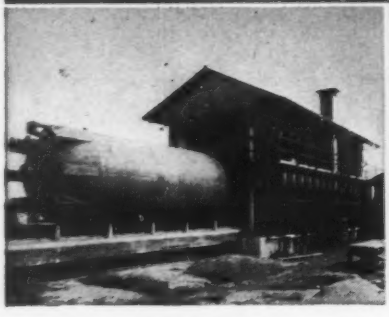

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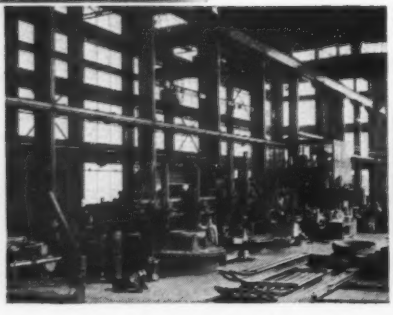

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THE OIL AND GAS JOURNAL

Reversing the Winter

WILL domestic refiners this summer reverse the operating situation of the past winter in which they overproduced gasoline in order to supply residual and intermediate products?

With the season of maximum motor-fuel consumption under way there is evidence that refiners as a group are in danger of accumulating excess supplies of products other than gasoline over the next 90 days. Motor fuel prices slumped last winter and comparable results in the heavier products due to excessive operations are certain should refiners maintain crude runs to stills which are not justified by over-all demands.

A few figures will suffice briefly to summarize conditions. Domestic crude-oil output averaged 4,964,410 bbl. daily last week exclusive of condensate, a new record. This production is in line with state allowables for June which are based on nominations of crude-oil buyers, but it is 294,410 bbl. daily greater than the Bureau of Mines estimated demand.

This disparity between production and projected demand of itself indicates that something is wrong. For the 4 weeks ended June 8 the decline in gasoline stocks was 143,000 bbl. daily, a figure in line with season conditions. But at the same time stocks of fuel oil, distillate, and kerosene increased 324,000 bbl. daily. These were largely May operations and do not reflect the large gain in output projected for all of June.

These comments are not meant to indicate weakness in petroleum demands. World consumption of petroleum passed the war peak several weeks ago and both domestic and foreign requirements are far ahead of the prewar output.

But the trend charts support the contention of those who feel that the current output for crude oil based on state allowables is excessive to the extent that it is building up inventories of fuel oil and intermediate products at rates not justified by yearly requirements. It is probable that this trend will be more apparent when data on June operations are available.

OPA critics can point to unwanted developments in refinery output as the inevitable results of ceilings and delayed price adjustments so that operators do not have the prewar yardstick with which to balance plant yields and demands. The accuracy of these criticisms can be demonstrated in the operations of practically all refineries over the past several months.

In the absence of these normal competitive price checks and fluctuations the industry has no choice but to use the data available in balancing its activities. A demand for crude oil which is not supported by requirements and normal variations in stocks is artificial and certain to lead to market difficulties. The vital statistics of the oil business need to be studied carefully in coming weeks.

Eighty-Five Industry Officials Named to OGD Council

by Henry D. Ralph

WASHINGTON.—The National Petroleum Council of 85 representatives of the oil and gas industries was announced this week by Secretary of the Interior J. A. Krug, and the first meeting was called in Washington June 21.

The membership includes 21 presidents or representatives of trade associations and seven from the natural-gas industry. It also includes 55 men who served at some time on the Petroleum Industry War Council.

Krug stressed that council members serve as representatives of the industry as a whole, not as representatives of their own companies. Nevertheless, he said in selecting the membership special attention was given to assuring a well balanced representation between large and small companies in all parts of the country and from all phases of oil and gas industries. While many of the members are affiliated with major companies, Krug pointed out that the preponderance of representation is from the smaller independent companies.

All members are appointed for 1 year except that the trade association members are appointed ex-officio and hold council membership only for the duration of their trade association offices. Those not officials of trade associations represent the industry at large, and no company has more than one representative on the council. All serve without compensation.

Ralph K. Davies, acting director of OGD, said it is contemplated that there will be established a series of national committees of the council which will broaden further the scope of industry representation and provide working groups of great value to the Government.

Advisory Council Membership

INVITATIONS to serve on the National Petroleum Council were sent to the following:

K. S. Adams, Phillips Petroleum Co.

H. T. Ashton, Western Petroleum Refiners Association.

Col. T. H. Barton, Lion Oil Co.

Burt R. Bay, Northern Natural Gas Co.

R. H. Blair, National Oil Marketers Association.

Jacob Blaustein, Pikesville, Md.

Paul G. Blazer, Ashland Oil & Refining Co.

W. R. Boyd, Jr., American Petroleum Institute.

Reid Brazell, Leonard Refineries, Inc.

J. S. Bridwell, Bridwell Oil Co.

Russell Brown, Independent Petroleum Association of America.

W. F. Clinger, Pennsylvania Grade Crude Oil Association.

Robert H. Colley, The Atlantic Refining Co.

Stewart Crocker, Columbia Gas & Electric Co.

Howard A. Cowden, Consumers Cooperative Association.

Henry M. Dawes, The Pure Oil Co.

E. DeGolyer, DeGolyer & McNaughton.

O. D. Donnell, The Ohio Oil Co.

Fayette B. Dow, National Petroleum Association.

J. Frank Drake, Gulf Oil Corp.

Gordon Duke, Southeastern Oil, Inc.

J. H. Dunn, Natural Gasoline Association of America.

James P. Dunnigan, Producers Refining Co., Inc.

LeRoy Edwards, Southern California Gas Co.

Richard Fenton, California Stripper Well Association.

W. H. Ferguson, Continental Oil Co.

R. G. Follis, Standard Oil Co. of California.

Jacob France, Mid-Continent Petroleum Corp.

Walter S. Hallanan, Plymouth Oil Co.

D. P. Hamilton, Root Petroleum Co.

Jake L. Hamon, Cox & Hamon.

B. A. Hardey, Shreveport, La.

George A. Hill, Jr., Houston Oil Co. of Texas.

W. T. Holliday, Standard Oil Co. (Ohio).

Eugene Holman, Standard Oil Co. (New Jersey).

D. A. Hulcy, Lone Star Gas Co.

W. F. Humphrey, Tide Water Associated Oil Co.

H. L. Hunt, Hunt Oil Co.

A. Jacobsen, Amerada Petroleum Corp.

B. Brewster Jennings, Socony-Vacuum Oil Co., Inc.

Allen A. Jergins, San Joaquin Valley Oil Producers Association.

Carl A. Johnson, Independent Refiners Association of California, Inc.

Charles S. Jones, Richfield Oil Corp.

W. Alton Jones, Cities Service Oil Co.

Frank Lerch, Consolidated Natural Gas Co.

Ralph Lloyd, Western Oil & Gas Association.

John M. Lovejoy, Seaboard Oil Co. of Delaware.

B. L. Majewski, Deep Rock Oil Corp.

A. C. Mattei, Honolulu Oil Corp.

Clyde Morrill, Independent Oil Men's Association of New England.

S. B. Mosher, Signal Oil & Gas Co.

Henry D. Moyle, Wasatch Oil Refining Co.

H. M. McClure, National Stripper Well Association.

N. C. McGowen, United Gas Pipe Line Co.

W. G. McGuire, Panhandle Eastern Oil Department, Farmers Union Central Exchange.

I. A. O'Shaughnessy, Globe Oil & Refining Co.

J. R. Parten, Premier Oil Refining Co.

William T. Payne, American Association of Oilwell Drilling Contractors.

J. Howard Pew, Sun Oil Co.

Joseph E. Pogue, Chase National Bank.

Frank M. Porter, Mid-Continent Oil and Gas Association.

H. J. Porter, Houston.

E. E. Pyles, Los Angeles.

E. B. Reeser, Barnsdall Oil Co.

Walter R. Reitz, Quaker State Oil Refining Co.

M. H. Robineau, The Frontier Refining Co.

W. S. S. Rodgers, The Texas Co.

Charles F. Roeser, Roeser & Pendleton, Inc.

Arch H. Rowan, Rowan Drilling Co.

G. L. Rowsey, Gulf Coast Refiners Association.

R. S. Shannon, Pioneer Oil Corp.

Harry F. Sinclair, Sinclair Oil Corp.

W. G. Skelly, Skelly Oil Co.

Ferd J. Spang, Petroleum Equipment Suppliers Association.

Reese H. Taylor, Union Oil Co. of California.

H. L. Thatcher, National Council of Independent Petroleum Associations.

R. Van Der Woude, Shell Union Oil Corp.

W. W. Vandeveer, Allied Oil Corp.

Grady Vaughn, Dallas.

Eric V. Weber, Ohio Petroleum Marketers Association.

W. C. Whaley, Oil Producers Agency of California.

H. C. Wiess, Humble Oil & Refining Co.

Robert E. Wilson, Standard Oil Co. (Indiana).

Ralph T. Zook, Sloan & Zook Co.

Synthetic gasoline produced by The Texas Co. was used to power this turbo-jet unit during the demonstration at the Army-Navy Petroleum Board's 2-day meeting last week for oil industry representatives. The Westinghouse Electric & Manufacturing Co. unit develops 200-lb. thrust at 3,700 r.p.m. The performance of synthetics and shale oil as fuel in a variety of military equipment was shown to the group at the meeting

Military-Industry Cooperation Stressed at ANPB Meeting

by Warren W. Burns

WASHINGTON.—The war-born cooperation between oil men in government and oil men in industry is slated to reach an all-time high in the years immediately ahead.

This is the impression carried away by participants in the 2-day meeting here June 13-14 of the Army-Navy Petroleum Board, a meeting in which the integrated plans of the Interior Department's Oil and Gas Division were explained by its acting director Ralph K. Davies. And indicative of the forthcoming ANPB-OGD relationship was the statement made to this writer by ANPB's executive officer, Col. G. H. Vogel.

"The postwar activities of ANPB must be closely integrated with oil men whose familiarity with oil problems, and methods of dealing with them, we in the Army and Navy have learned to respect," Colonel Vogel said. ANPB's executive officer added that he hoped the forthcoming National Petroleum Council would have some sort of a committee or subcommittee to work closely with oil men on the Army-Navy Petroleum Board.

Emphasizing his point, in the opening remarks of the second day's meeting, Colonel Vogel explained that the Army now has 12 regular Army officers studying oil problems at the University of Pittsburgh and that soon these men will work, for at least 1 year, in various oil companies in order to obtain as full an understanding as possible of oil industry problems.

Moreover, the desire to work closely with industry is not just peacetime expediency, for both ANPB's Colonel Vogel and OGD's Davies were frank in admitting that the third world war is a possibility. "We may not have another Admiral Carter then," was the way Vogel expressed it, and Davies made the same point in stating that "the next time we may not have time to organize."

In mentioning Admiral Carter, Colonel Vogel referred to his predecessor, Rear Adm. A. F. Carter, who served throughout the war as ANPB's executive officer. Carter is now resident director in London of the newly organized United Overseas Petroleum Co., Ltd., a subsidiary of Standard Oil Co. of California and the Texas Co.

Speaking of plans to organize the National Petroleum Council (in substance, a peacetime Petroleum Industry War Council), Davies explained that some oil men were apprehensive of such an advisory body and that these oil men would prefer to see an ineffective and disorganized oil setup in Washington rather than any centralized group. Davies said that he thought such a viewpoint "unsound and short-sighted," and urged the oil industry to support a "strong government oil agency—of which the council would be a part—with sound management." As members of the projected council, Davies explained, "the oil industry can be in on what is taking place and can have a hand in molding the future."

Published Reports Scored

OGD's acting director again took occasion to score published reports that the Justice Department would have a hand in deciding which oil men will be selected for membership. If oil men were barred by membership because of having been indicted by the Justice Department, Davies said, it would be impossible to draw up a representative list. The remark drew a round of laughter.

While technical conferences and round-table discussions constituted a major portion of the 2-day meeting, the participating oil men—most of whom saw service either with ANPB during the war or who handled oil problems elsewhere in the services—witnessed, on a trip to Annapolis the continuance of government-industry relationships. This time it was with specially devised synthetic fuels developed largely by three oil companies and used in Army-Navy combat vehicles.

The full-scale demonstration of synthetic gasolines, diesel fuels and lubricants, carried on at the Naval Engineering Station, was conducted under the supervision of Capt. D. H. Clark, director of the Annapolis experiment station. The demonstration showed that blends of synthetic and natural fuels—and synthetic fuels alone—could be used to operate standard amphibious craft, small boats and vehicles. It represented the present state of development in manufacture of synthetic fuels in the United States.

Through members of the Navy cooperative committee on fuels and lubricants, several oil companies supplied synthetic materials for the demonstration which ANPB members and guests witnessed from a German minesweep and amphibious tanks.

The Texas Co., through Dr. W. E. Kuhn, supplied synthetic gasoline, synthetic diesel fuel, synthetic lubricating oils and a synthetic grease. The Esso Laboratories, research and devel-

opment organization of Standard Oil Co. (New Jersey), through Stuart Hulse, supplied synthetic gasolines and synthetic diesel fuel. The Union Oil Co. of California, through W. L. Stewart, Jr., supplied gasoline and diesel fuel from shale. Diesel fuel, manufactured to Navy specifications from coal, was supplied under special contract by the Kuhlman Co. of France, the only liquid of foreign manufacture. Kuhlman used the Fischer-Tropsch process.

The motor and diesel fuel supplied by Texaco and Esso was manufactured from natural gas. Shale was the source from which Union supplied its synthetic motor and diesel fuel. The gasoline was obtained from the retorting of shale. Texaco supplied synthetic lubricating oil, SAE-30 TL-964. Carbide & Carbon Chemicals Corp. also supplied SAE-30 lube oil. A synthetic lubricating oil, polyethylene type, came from France.

The Navy exhibit included the German (Jentzsche) shipboard petroleum tester in operation; comparative low temperature performance of synthetic oils and greases; comparative working performance of synthetic greases; representative products from Scottish shale; crude products taken from Navy shale reserves; flow-plans of various synthetic fuel and lubricant manufacturing processes; comparative water retention properties and sulfur content of synthetic diesel fuels; samples of a variety of synthetic diesel fuels, gasolines, lubricating oils and greases; and products derived from "Gilsonite."

Portable Pipe Line Exhibited

A portable invasion-type pipe line, complete with collapsible storage tanks, booster pumps, and tank trucks, was exhibited by the Army Quartermaster. ANPB personnel and guests were conducted on a short tour and saw actual operations demonstrated, including the washing and refilling of the Army's 5-gal. gasoline field cans.

In presenting the synthetic fuel and lubricant demonstrations, Navy officials pointed out that it might be necessary to redesign present-day engines to take advantage of synthetic combustibles, "as the Navy must be prepared to utilize all types of fuel." The studies which the Navy is now undertaking, with the cooperation of the oil industry and engine manufacturers, will provide the factual data necessary to plan the design of engines capable of most efficient utilization of synthetic fuels. Furthermore, it was explained that:

"Since the Navy is the world's largest consumer of oil, the national security requires that every possible source of fuel be investigated to prevent development of shortages in time of emergency. To this end, the Navy cooperative committee on fuels and lubricants has been requested to undertake a study of synthetic fuels."

The efficiency of synthetic fuels and blends of synthetic with natural fuels was demonstrated in landing craft, amphibious tanks, an experimental gas turbine and a turbo-jet Westinghouse engine. An Army Air Force officer stated that the bulk of the Army's jet propulsion fuel needs have been on the West Coast and that requirements for the 1947 fiscal year have been estimated at 2,400,000 bbl. Bids on from one-fifth to one-sixth of these requirements reportedly have been made.

Officials of Esso Laboratories explained that their synthetic gasoline and synthetic diesel fuel, used in the demonstrations, were both produced at the large-scale pilot plant at Baton Rouge, La., by the hydrocarbon synthesis process—a further development of the basic fluid catalytic technique.

Explaining the synthetic fuel activities of the Bureau of Mines, that agency's Dr. W. C. Schroeder justified government expenditures along this line on two beliefs:

1. That the U. S. faces a "prospective shortage" of indigenous crude.

2. That while the U. S. can rely, to some extent, on crude and petroleum product imports during times of peace, that neither the Middle East nor even South America could be relied on in time of war.

Dr. Schroeder was careful to emphasize that he didn't see any U. S. oil shortage in the immediate future, but stated that in the past few years the crude reserves discovered amounted only to one-third of the crude consumed.

In conducting the Bureau of Mines' synthetic fuel experiments, Schroeder said that considerable attention was being given to the gasoline-from-oil shale possibilities. The U. S. has an estimated 92,000,000,000-bbl. reserve which can be recovered from oil shale, the Bureau of Mines official said, adding, however, that the hydrogenation costs for equipment are from 8 to 10 times as great as equipment for an oil refinery.

At present, Dr. Schroeder stated, aviation gasoline can be produced from a small synthetic plant at a cost ranging from 12 cents to 15 cents per gallon. Moreover, if costs of gasoline from petroleum go up, he saw the margin becoming narrower.

In a special appeal to all Army-Navy Petroleum Board members and guests, at the 2-day meeting here, June 13-14, the Navy's Capt. P. P. Blackburn, an ANPB deputy executive officer, asked that the names and addresses of all discharged Navy officers and enlisted personnel connected with oil activities during the war be mailed to him as soon as possible. The Navy's personnel records are not readily available, he said.

New Synthesis Plant Studied by Stanolind

STANOLIND OIL & GAS CO. has under consideration plans to build a natural-gas synthesis plant in the Kansas sector of Hugoton field, it was disclosed last week in Tulsa.

The plant is the second of its type projected in the United States. Carthage Hydrocol, Inc., has completed plans to build a $15,000,000 plant near Brownsville, Tex. A description of the process was carried on page 102 of The Oil and Gas Journal's June 15 issue in an article by P. C. Keith, president of Hydrocarbon Research, Inc.

As tentatively planned, the Stanolind plant will use 100,000,000 cu. ft. of natural gas daily to produce 6,000 bbl. daily of gasoline and 1,000 bbl. daily of distillate fuels. The products probably will be distributed in the Kansas area.

Completion of the proposed plant may be delayed as long as 2 years due to the difficulty of obtaining materials. Its exact location will be decided on after studies of transportation problems involved.

Stanolind has conducted extensive research and pilot plant operations on processes of synthesizing liquid hydrocarbons from natural gas at its laboratories in Tulsa. The processes are based on the German Fischer-Tropsch method.

Texas Political Campaign Brings Out Tax Schemes

Political proposals for a heavy tax on Texas' huge natural gas production were heard here last week while the Louisiana Legislature wrangled over similar schemes in Baton Rouge.

Two candidates for the Texas gubernatorial race are advocating a 1-cent per 1,000 cu. ft. tax on natural gas to replace the present ad valorem levy of 5.2 per cent of well-head market value. These candidates are Homer P. Rainey and Caso March. Rainey also is proposing an additional 1-cent a barrel tax on oil.

In Louisiana, industry representatives earlier had warned state officials the five-fold hike in Louisiana's natural gas tax would hinder the state's industrial growth. The proposed 3-cent per 1,000 cu. ft. tax is advocated by P. A. Frye, state gas conservation director, who has also recommended gas proration for the state.

Despite the unfavorable report of the Lousiana Revenue Code Commission and of a legislative committee, both of which rejected the tax proposal, the Louisiana house last week voted to keep the tax plan alive and on its agenda.

XUM

THIS 1946 WEEK

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PRODUCTION—United States crude production establishes record for second consecutive week. . . . Output climbs to 4,990,610 bbl. daily. . . . Total is 57,000 bbl. daily over wartime peak of last August and 48,240 bbl. daily over the previous high June 8. . . . ¶Texas Railroad Commission sets hearings for late July to consider new maximum efficient rates of production for Texas fields. . . . ¶E. O. Thompson, commission member, asserts the industry is faced with strongest demand situation in its history and again calls for decontrol to allow proper price incentive for new discoveries. . . . ¶Sharp drop reported in bottom-hole pressure in East Texas during May. . . . ¶Shell begins limited pipe-line proration in Wasson pool in West Texas. . . . Transportation facilities unable to handle 4,300 bbl. daily of increased allowable. . . . Commission asked to reduce proration accordingly. . . .

REGULATION—Davies calls initial meeting of new petroleum council June 21. . . . Goes before special meeting of Senator O'Mahoney's petroleum resources committee to explain aims and organization of OGD. . . . Assures O'Mahoney new agency will steer clear of Congress' policy-making sphere. . . . ¶Unconfirmed reports say negotiations between oil companies and Justice Department for consent decree in "Mother Hubbard" suit have been broken off. . . . Both sides said to be ready to fight out the issue in court. . . .

PRICES—OPA extension measure passes Senate with provision for mandatory decontrol of oil prior to June 30. . . . Bill now in Senate-House conference. . . . Some chance of a presidential veto seen, but any outcome likely to result in decontrol for petroleum. . . . ¶Stripper subsidy payments appear doomed. . . . Senate OPA bill specifies elimination of subsidies on products not subject to price control. . . . ¶Gasoline prices continue climb back up to ceiling levels. . . . Off-season demand heavy for kerosene and distillate oils. . . . ¶Fresh reports point to mounting demand for gasoline. . . . Demand in week ended June 8 figured 22,000 bbl. daily over preceding week. . . . Gasoline stocks drop 1,101,000 bbl. to 94,146,000-bbl. total. . . .

LEGISLATION—Public lands leasing bill passes Senate by unanimous consent. . . . Measure now goes to House. . . . Passage before adjournment considered likely. . . . ¶Sponsors of resolution to quitclaim tidelands to the states prepare to call measure before the Senate this week. . . . ¶Supreme Court agrees to rule on federal Government's tidelands ownership suit against California. . . . Sets case for arguments next October. . . .

SUBSTITUTE PRODUCTS—Stanolind Oil & Gas discloses it is studying plans to erect a plant in western Kansas to produce gasoline from natural gas. . . . Tentative plans set daily production at 6,000 bbl. of gasoline and 1,000 bbl. of distillates. . . . ¶Industry group at Army-Navy Petroleum Board's meeting in Washington witnesses demonstration of fuels derived from shale oil and natural gas. . . . Meeting underscores desire of military to work closely with the industry in national defense planning. . . .

NATURAL GAS—Last public hearing in FPC's protracted investigation of the natural-gas industry opens in Washington. . . . First day brings testimony on the use of gas as raw material for chemicals manufacture. . . . Hearing expected to last 5 or 6 weeks. . . .

This Navy Patrol Boat is operating on fuel consisting of synthetics blended with shale oil. It is one of a number of pieces of military equipment in which the use of substitute fuels was demonstrated last week during the Army-Navy Petroleum Board's 2-day meeting for oil industry representatives. The synthetic fuel used in the patrol boat shown above was supplied by The Texas Co. and Standard Oil Development Co. with the shale oil produced by Union Oil Co. of California. The resulting blended product gave Navy specification (50 cetane number) diesel fuel

XUM

J. F. Swain, Huntley & Huntley, Pittsburgh; P. L. Kesel, Carnegie Natural Gas Co., Pittsburgh; J. V. Goodman, Equitable Gas Co., Pittsburgh; V. F. Bowyer, Peoples Natural Gas Co., Pittsburgh; K. C. Cottingham, Ohio Fuel Gas Co., Columbus; K. E. Haase, and S. S. Galpin, Peoples Natural Gas Co.

Government Control, Secondary Recovery Are Topics of A.P.I. Meeting at Pittsburgh

by Kenneth B. Barnes

PITTSBURGH.—The eastern U. S. production area includes places where crude oil sells at $3.75 per barrel and natural gas at 22 cents per M.c.f. at the well head. The reasons for this of course are that the oil and gas there are scarce, hard to find and to produce profitably, and require specialized and costly secondary-recovery processes.

The production from some of the eastern fields is relatively low even with the practices and facilities available, considering the potential markets and demands. However, the 400 or more in attendance here at the eastern production district meeting of the A.P.I. at the William Penn Hotel on June 13-14 listened to 10 technical papers which described how production might be increased through engineering improvements. The papers discussed features connected with water flooding, repressuring and drilling methods, and further exploration possibilities.

The eastern production district also happens to be close to Washington. Maybe this proximity to the key figures and happenings at that governmental center gives the eastern oil men unusual awareness of what happens there, for some of the things "done in Washington" were heavily scored by three speakers. These addresses were devoted to the general business situation as concerned with oil and gas.

In "Problems We Face Today," Walter S. Hallanan, president, Plymouth Oil Co., Pittsburgh, reviewed the list of achievements and contributions that oil and gas made in aiding victory in World War 2, then said "there is a reason why we were prepared to meet the incredible demands of the war effort—a reason why we were rich in reserves and facilities and technical skill when the world struggle was brought to our door. It was not because we have the greatest petroleum reserves in the world, for we do not. It was not because we are a superior race of men, for we are not. Very simply, it was because we had a system of government—and I use the past tense advisedly—that did not unduly restrict private initiative and private enterprise, nor did it impede intelligent economic progress. The record of world-wide petroleum production can be examined, dissected, weighed and measured, and no other conclusion can be reached.

" . . . In the emergency of war, American industry was necessarily subjected to a high degree of regimentation from Washington. Control of the nation's economy was vested in the Government. Along with other segments of industry, along with the millions of men who were regimented into the fighting services and into labor in the mills and mines and on the farms, we cheerfully accepted these controls as necessary to speedy and total victory. Total war has been over now for almost a year, but we find that those who came into extraordinary power over the lives of the people, as the result of the emergency of war, are determined to retain that power in peacetime and for all time to come. They enjoy the privilege of pushing people around. They stand defiantly today to challenge the right of the people to run their own Government."

E. Holley Poe, natural-gas consultant of New York City, in telling the A.P.I. group about the Federal Power Commission's investigation of the natural-gas industry, said the issues in the matter rounded down to the questions: (1) Should regulation and control of business be centralized in administrative agencies of the federal Government and at the expense

W. S. Hallanan, Plymouth Oil Co., Pittsburgh, who delivered one of the principal addresses; V. F. Bowyer; D. S. Keenan, Carnegie Natural Gas Co., Pittsburgh, and E. Holley Poe, E. Holley Poe & Associates New York

of states rights? (2) Should the Federal Power Commission confine its regulatory activities within the orbit prescribed by Congress or shall its power be extended by Congress to the regulation of all production, gathering, distribution and utilization of natural gas?

Poe added that a third question might well follow, "shall the Federal Power Commission or the owner and manager operate the gas business?" Poe admonished the oil group that every advance made toward the absolute regulation and control of natural gas brings that same control nearer to the producer's oil production and the refiner's finished products. He warned that the problems of the natural-gas industry are likewise the problems of the oil industry, and added that some oil-and-gas-producing firms even now fear they will be classified as public utilities if they deliver gas to interstate pipe lines.

More on government control was added by H. M. McClure, independent producer of Alma, Mich., when he said: "Crude oil is now only 71 per cent of the 1926 base period. In marked contrast, all raw materials are over 120 per cent and wages over 180 per cent. Under a continuance of this program the future existence of the producing departments or companies can easily be measured by the amount of cash and crude reserves that now appear on their balance sheet, as no company large or small can survive through the years, when the principle item on their inventory is sold below the cost of replacement." McClure's paper was "Oil Economics."

New Officers Elected for District

R. B. Anderson, Columbian Carbon Co., Charleston, W. Va., was elected chairman of the district. He takes over from Virgil F. Bowyer, Peoples Natural Gas Co., Pittsburgh. I. G. Burrell, Bridgeport, Ill., of Ohio Oil Co., is a new vice chairman, as are K. C. Cottingham, The Ohio Fuel Gas Co., Columbus; W. L. McCloy, Jr., Standard Oil Co. (Ohio), Cleveland; J. E. Schaefer, The East Ohio Gas Corp., Cleveland; W. E. Schoeneck, The Ohio Oil Co. Grand Rapids. From Pittsburgh, new vice chairmen are J. F. Swain, of Huntley & Huntley, and S. M. Vockel, Waverly Oil Works Co., while P. J. Kesel of Carnegie Natural Gas Co. is secretary-treasurer.

A joint meeting was held of the eastern district subcommittee on secondary - recovery methods and production technology, K. H. Andresen, Quaker State Oil Refining Co., Bradford, Pa., chairman, and the Illinois-Indiana-Kentucky Secondary Recovery Committee, Frederick Squires, Illinois Geological Survey, chairman.

This group has been extremely diligent in research work on improved secondary - recovery operations and currently has 16 different study topics and research projects under way. Each month a meeting has been held where one of the projects was reported on, the meetings having been variously at Bradford, Oil City, State College, Pittsburgh, Cleveland, and Columbus. Some 35 members are engaged in the studies. At the Pittsburgh joint meeting John Buckwalter of Ryder-Scott Co., Bradford, presented a progress report on his assignment, "Effect of Nonuniform Reservoir Pressures on Water Input Rates." In the work, a 172-acre Bradford property which had been core analyzed in 113 input wells was intensively investigated. Seven figures and maps were shown for these data depicting subsurface sand contours, net pay thicknesses, average permeability, water saturation, oil saturation, reservoir pressure created in various areas by former localized flooding and adjacent input operations, and present oil - well pump - off times. Field data for this were collected by F. W. Ellenberger, Kendall Refining Co., Bradford. Several other of the eastern district A.P.I. committees also met.

The technical presentations (abstracts of the articles are found in this issue of the Journal, starting on page 122) were given by George W. Holbrook, vice president, Empire Gas & Fuel Co., Ltd., Wellsville, N. Y.; A. R. Ellenberger, Smith-Newton Oil Co. Laboratory, Bradford, Pa.; Dr. S. T. Yuster, associate professor, The Pennsylvania State College; Douglas Rogers, Jr., geologist, South Penn Natural Gas Co., Parkersburg, W. Va.; Dr. E. T. Heck, geologist, New York State Museum, Albany; Paul Walton, chief engineer, Industrial Gas Corp., Newark, Ohio; J. Gordon Burch, Burch Agate Torpedo, Borger, Tex.; Bruce Miller, drilling superintendent, The Ohio Oil Co., Findlay, Ohio; and Harold W. Haupt, vice president, Acme Drilling Co., Grennsburg, Pa.

Southern Union Gas Co. To Sell Oil Properties

CHICAGO. — Southern Union Gas Co. is planning to dispose of its oil properties and offer its common stockholders the right to buy the common stock of its wholly owned producing subsidiary, Delhi Oil Corp.

Southern Union operates natural-gas producing, transmission and distribution properties. It entered the oil-producing business with the formation of Southern Union Development Co., which later became Delhi Oil Corp. Delhi initially took over Southern Union's Louisiana producing properties and later acquired the company's 16 wells and leases in New Mexico.

Texas Allowable Fixed at 26,326 Bbl. Under June

ALLOWED oil production in Texas for July was fixed by the Texas Railroad Commission Tuesday at 26,326 bbl. daily below the record-high June allowable.

Under the commission's order, the high June production will be continued except for three fields where transportation facilities are considered inadequate and in the East Texas field where another bottom-hole pressure drop was reported.

Total July allowable was set at 2,386,381 bbl. daily. With estimated underproduction of 5.44 per cent, or 126,819 bbl., the allowable will yield 2,256,562 bbl. daily. Texas production of crude alone will be 146,562 bbl. daily over the Bureau of Mines July demand forecast of 2,110,000.

In addition, Texas will produce during July 173,346 bbl. daily of condensates and natural gasoline. E. O. Thompson, commission member, in announcing the allowable order, pointed out total Texas production of crude, naturals, and condensate will be 2,429,908 bbl. daily—319,908 bbl. daily over the Bureau of Mines forecast.

Most of the 26,326 bbl. daily production in July allowable was taken by the East Texas field where bottom-hole pressure during May dropped 10.18 lb. to 1,001.16 lb. June 1. Production from the East Texas field was set at 319,317 bbl. daily, 10,161 bbl. daily below the field's June allowable. Other allowable cuts were ordered for Fullerton, Wasson, and Yates fields because of the lack of transportation facilities or physical waste under current allowables.

Thompson earlier said, "The cold facts are that the demand for oil and petroleum products have exceeded the fondest and most optimistic estimates . . .

"The Bureau of Mines report of June 8—the latest—shows that crude stocks decreased for the week 2,296,000 bbl. or a decline of 328,000 bbl. per day. This net drop was in the face of an increase of 125,000 bbl. in imported crude stocks. All Texas crude stocks net decrease was 1,341,000 bbl. or a little more than one-half of the total nation's crude stock decline.

"The present wells and the present oil fields will be sorely taxed to meet demand. We must find new fields. We can't keep up this rate of production without new discoveries. The oil industry should be promptly decontrolled as to price so that the profit incentive under the law of supply and demand can again be free to urge oil operators to drill as never before in search for oil."

XUM

International

WORLD-WIDE OIL DEVELOPMENTS

Venezuelan Production Continues to Rise

CARACAS.—Venezuelan production continued to rise during April, averaging 1,043,330 bbl. daily, compared with the 1,006,379 bbl. daily average for the first quarter of 1946, an increase of 3.7 per cent. Production for 1945 and the first quarter, 1946, were carried in The Oil and Gas Journal's International Section of June 15.

Creole Petroleum Corp., Venezuela's largest producer, averaged 566,909 bbl. during April, according to latest reports. Venezuelan Oil Concessions, Ltd., second largest producer, averaged 202,842 bbl. daily, compared to 198,987 bbl. daily average during the first quarter. The three principal fields, Lagunillas, Guara, and Cabimas, produced 9,487,213 bbl., 2,206,972 bbl., and 1,791,346 bbl. during April 1.

VENEZUELAN PRODUCTION BY FIELDS

(Figures in barrels)

Field—	April production
Cabimas	1,791,346
Lagunillas	9,487,213
Tia Juana	5,222,530
Bachaquero	1,266,208
Pueblo Viejo	219,727
La Concepcion	98,711
La Paz	1,005,486
Mene Grande	1,118,174
El Cubo	506,618
Cumarebo	139,957
El Mene de Mauroa	15,701
Hombre Pintado	18,639
Netick	8,266
Mara	182,456
Quiriquire	1,524,113
Temblador	189,237
Oficina	1,100,070
Jusepin	1,740,412
San Joaquin	309,134
El Roble	136,604
Guario	164,893
Quiamare	6,190
Santa Rosa	36,535
Los Caritos	5,039
Pirital	226
Las Mercedes	4,007
Leona	173,354
Santa Barbara	1,273,209
Tucupita	2,894
Guico	398,377
Rincon Largo	67,365
Mulata	880,242
Guara	2,206,972
Total	31,299,905

VENEZUELAN PRODUCTION BY COMPANIES

(Figures in barrels)

Company—	April production
Caribbean Petroleum Co.	1,300,630
Venezuelan Oil Concessions, Ltd.	6,085,247
Colon Development Co., Ltd.	506,618
Creole Petroleum Corp.	17,007,279
Mene Grande Oil Co.	4,844,182
British Controlled Oilfields, Ltd.	34,340
Socony-Vacuum Oil Co.	563,270
Compania Consolidada de Petroleo	870,542
Texas Petroleum Co.	75,297
Orinoco Oil Co.	8,266
Venezuelan Atlantic Refining	227
Soc. Anma. Petrolera Las Mercedes	4,007
Total	31,299,905
Daily average	1,043,330

Colombian Company Maps Exploratory Activities

BOGOTA.—In planning to continue its current exploratory program in Colombia, Petroleos Ariguani, S.A., recently appropriated Ps 3,543,900 ($2,022,000) for work during the remainder of this year and for the first 4 months of 1947.

Petroleos Ariguani is 50 per cent owned by Tropical Oil Co. and 50 per cent by Colombian nationals. The Colombian interests are approximately the same as those in the company which preceded Ariguani, known as Sociedad Nacional del Carrare, and in which Tropical participated on the same basis. When operating under the latter name, two wildcats were drilled with no success in approximately the same region where Ariguani is now drilling.

The Ariguani wildcat, known as 1 Costarica—which was spudded September 25—is now below 8,700 ft., and is located on a fault structure which is believed to be a continuation NE-SW of the Dificil and San Angel structural trends where Shell is wildcatting. The surface formation here is Miocene down to 6,313 ft. Shale with sand streaks were encountered to this depth.

Sand streaks were found between 2,300 to 6,457 ft. where a 9⅝-in. string was set. Sand streaks were also encountered at the following depths: 2,300-20 ft.; 3,195-3,205 ft., 3,470-80 ft.; 4,160-70 ft.; 4,640-60 ft.; 5,200-20 ft.; 5,550-70 ft.; others at 6,100 ft. A somewhat porous, permeable sand was encountered at 6,220-50 ft. and at 6,300 ft. All these sands gave gas and light oil showings. The 6,220-50-ft. sand had a high gas pressure, much salt water, but no oil showings.

Paleontologists report that the Miocene-Oligocene contact is approximately at 6,313 ft., and it is believed to be similar to Shell's Dificil encountered at 4,290 ft. A deeper test, however, is required than for Dificil. The findings are said to be most encouraging and the data obtained quite valuable. Drilling continues at depths below 7,400 ft. The rig being used here is good for about 12,000 ft.

Ariguani holds the Costarica and La Granada concessions located southwest and adjacent to Shell's Dificil block, Magdalena Department, Caribbean prospective oil area of Colombia.

Ariguani's 1946-47 exploratory activities include the completion of its Costarica wildcat; spudding and drilling two additional wells on the Costarica concession; spudding and drilling of a La Granada wildcat; and extensive seismograph activities. When the drilling rig ordered early this year by Ariguani arrives, it will be used for the La Granada test.

A total of Ps 4,528,207 ($2,582,000) is the approximate amount being spent on Ariguani's current wildcat program.

Fewer Autos, Finland Needs Less Gasoline

Finland's present gasoline requirements are now between 765,000 and 850,000 bbl. a year, compared to prewar consumption of some 1,275,000 bbl. a year, according to the U. S. Department of Commerce. A decrease in the number of automobiles is considered responsible for the reduction.

All gasoline is reported to be mixed with alcohol, in the proportion of 72 per cent gasoline and 28 per cent alcohol. Although imports of gasoline are expected when the seas are free of ice, it was suggested that gasoline prices be kept high so that generator gas could compete favorably, the report said.

XUM

Colombian Wildcat Now Coring Beyond 7,481 Ft.

NEW YORK.—The Texas Co.'s Velasquez 1, Colombian test which recently was reported to have encountered promising oil shows, is now down to 7,481 ft. and coring deeper.

Casing is expected to be set somewhere beyond this depth, and electric logs run. Oil found between 7,254-74 ft. following a drill-stem test is 30°-gravity A.P.I. Officials here said the company is "optimistic rather than enthusiastic."

Velasquez 1, spudded December 8, is located in The Texas Co.'s fee tract Teran-Guaguaqui which covers 314,000 acres. It is some 400 miles from the Caribbean tidewater. The test is the first wildcat drilled by the company outside the Barco concession which is held jointly with Socony-Vacuum Oil Co. of Colombia. The Texas Co.'s original program in the area called for three wells, but a more intensive exploratory program is expected to result from the findings in Velasquez 1.

Iran's Daily Average Output Shows Gain

NEW YORK.—Crude oil production in Iran for January and February of this year amounted to 1,571,000 tons (10,997,000 bbl.) and 1,496,000 tons (10,472,000 bbl.), respectively, according to B. R. Jackson, representative here of Anglo-Iranian Oil Co., Ltd. Daily average was 354,742 bbl. for January, and 374,000 for February.

Anglo-Iranian's 1945 production totaled 16,839,000 tons (123,873,000 bbl.), as compared with 1944 production of 13,274,243 tons (92,919,701 bbl.).

Reconstruction of French Refineries Moving Slowly

NEW YORK.—According to reports received here, reconstruction work on the French refineries, started last fall, is progressing slowly. However, refineries in the Lower Seine and three in southern France are said to be in operation.

Principal reason given for the slow return to normal is the lack of mechanical equipment at the refineries, necessitating rebuilding by hand. It is reported that an abundant supply of mechanical equipment necessary for the rehabilitation and reconstruction work would be available, yet cannot be touched because of various restrictions involved.

Refineries now in operation include those which sustained minor damage in the war. Standard Francaise des Petroles (Standard of New Jersey), a 23,000-bbl. skimming and cracking unit at Port Jerome, second largest before the war, was not so much destroyed as it was looted by the Germans who removed the steam plant, dewaxing plant, and part of the cracking facilities to their own refineries behind forces then advancing into Russia.

Vacuum Oil Co.'s refinery at Gravenchon has resumed operations. This plant suffered some war damage, but the steam plant, power plant, and part of the cracking equipment was left intact.

Societe Anonyme des Petroles Jupiter (Shell) plant at Petite Couronne, near Rouen, is now in operation, and the large plant of Compagnie Francaise de Raffinage, at Gonfreville near Havre will be ready to reopen about June of this year. The three southern refineries, reported already on stream, are Compagnie Francaise de Raffinage, Anglo-Iranian, and the Frontignan.

Tri-Pet Corp. to Start Colombian Drilling Soon

NEW YORK. — Approximately 1 year after the formation of Tri-Pet Corp.—jointly owned by Sinclair Oil Corp., Cities Service Oil Co., and Richfield Oil Corp. of California—for exploration purposes in Colombia, the company expects to start drilling operations shortly at San Andres, about 75 miles south of Cartagena. The concession, about 50,000 hectares in area, is privately owned property.

About 25 years ago Gulf Oil Corp. drilled two wells in this area, using cable tools. One well was a dry hole and the other showed a little gas and oil. Tri-Pet will use a rotary rig.

Tri-Pet which operates in Colombia under the name of Companias Unidas de Petroleo, S. A., has applied for 14 other concessions, a minimum of 50,000 hectares each, located mostly on the western seaboard area north and south of Cartagena.

First Postwar Oil Cargo Arrives in Norway

COPENHAGEN.—The first shipment of petroleum products to arrive in Norway from Abadan, Iran, since the end of hostilities, came in recently on the tanker Garonne which had a cargo of 10,000 tons (70,000 bbl.).

Norway has no production and no refining facilities. Prior to the war a Standard Oil Co. (New Jersey) affiliate, A. S. Norsk Amerikansk Mineraloljecompagni, operated a small 1,200-bbl. refinery at Vallo, but this was blown to bits during the last 2 weeks of the European war. Whether this plant will be rebuilt has not yet been decided by officials in charge.

International

WORLD-WIDE OIL DEVELOPMENTS

At some future date it is expected that certain areas of Norway's Spitzbergen Islands, which lie between Norway and the North Pole, may be explored for possible crude deposits. Currently, these islands yield relatively large coal deposits.

New Venezuelan Contract Broadens Termination Pay

CARACAS.—In addition to a 2-bolivar (about 60 cents) a day wage increase, Venezuelan oil workers have been granted 2 weeks' termination pay—after being on the pay roll for 3 years—and will be entitled to it in case of death or resignation. Previously, the termination pay was granted only if an employe was discharged.

The 2-bolivar per day wage hike applies to so-called laborers (that is, those who work on a daily basis) and employes (those who work on a monthly basis). Oil companies in Venezuela also agreed to carry more items in their commissaries than merely food. The new contract is for 19 months.

The companies also agreed to pay laborers on a 7-day basis although they will work only 6 days.

Peruvian Concession Studied

LIMA. — The Senate of Peru has under consideration a government bill granting International Petroleum Co., Ltd. (New Jersey Standard), a concession to explore for oil in the Sechura desert zone of northern Peru. The bill has been passed by the House. Both houses of Congress are reported to have approved a $5,000,000 government loan from International Petroleum for materials and equipment to be used in road building.

Aleutian Deliveries Made

SAN FRANCISCO.—With the delivery of 135,000 bbl. of petroleum products to its Dutch Harbor terminal in the Aleutian Islands, Standard Oil Co. of California has resumed peacetime operations there. Since the outbreak of war, Dutch Harbor has been operated by the Navy. The company has announced plans to build two new bulk plants in Bristol Bay, at Dillingham and Naknak on the shore of the Alaskan mainland, at a cost of $105,000.

XUM

Colombia May Encourage Exploration By a More Liberal Concession Policy

by Warren W. Burns

IF Colombia's proposed (revised) petroleum law, which would supersede oil law 37 of 1931, is not passed in the near future, it is conceivable that the Colombian Government will, rather than delay further, encourage additional exploration by granting oil companies operating there more than two concessions each. Since enactment of the 1931 law, 47 concessions have been granted.

The policy limiting each company to two concessions, which was inaugurated comparatively recently, resulted in some of the companies accepting the government's offer, along with a most important "rider," which provides that when and if the revised petroleum law is passed, the companies will pay higher surface rentals during the exploration periods; 2 per cent higher royalties; and make a 25 per cent down payment as an initial concession tax, with the remaining 75 per cent to be paid if commercial oil is produced.

Surface rentals, under the proposed law, would range from 1 peso per hectare (2.4 acres) east of the Cordilleras, to 2 pesos per hectare west of the Cordilleras. The 25 per cent down payment is based on the number of hectares covered by contract.

Another provision of the proposed law would split present applied-for concessions (which total about 417) in half. This, naturally, would double drilling obligations, but it is understood that this concession split will not apply to those accepted under the above terms, which the companies were granted prior to the effective date of the proposed law.

Socony-Vacuum Oil Co., Inc., first concession signed under terms of the oil law plus the rider, is the Aguas Claras, a 9,500-hectare block filed as bid No. 218 in 1943 and under the name of Sociedad de Fomento Petrolero, a subsidiary. This tract is located due east of Socony's Cantagallo and Pedral blocks and adjacent to and west of Las Monas track where 1 La Salina test was recently spudded.

The other three grants signed under these terms are: Tropical, Chaviva, 200,000-hectare block in the Llanos; Tropical, El Paso, 23,840-hectare block in the Caribbean area; and Texas, San Antonio, 46,469-hectare block in the Upper Magdalena Valley.

Tropical Moving Equipment

Tropical is reported moving to the Llanos some 1,700 tons of oil-field equipment to carry out the first test. This trip involves a 435-mile sail up Magdalena River to La Dorada, a transfer to the railroad at Bogota, some 75 miles, truck transportation to Villavicencio, 75 miles, and to Pt. Lopez on the Meta River, about 50 miles more. Then the equipment must move downstream on Meta River to Chaviva. some 40 miles, on barges which have a 2½-ft. maximum draft. Maximum operating draft in the Meta in the wet season is 4 ft. Spudding of the scheduled 12,000-ft. test may take place in June or July. A Wilson Titan rig will be used.

The Texas grant, originally solicited by Texas Petroleum Co. and later transferred to Caldas Petroleum Co. (a Texas subsidiary), will be drilled by Tropical, according to contract. Complete drilling equipment which has been stored at Puerto Salgar for some time, will be moved to location soon. About 25 years ago, Transcontinental Oil Co. drilled two tests 25 miles upstream from this block, 1 Penaranda to 1,465 ft., and 1 Camacho to 3,111 ft., but it is believed that neither well was drilled deep enough to reach the possible pay formation.

The two most important factors which have retarded Colombia's oil developments have been costly transportation and the complicated legalistic problems regarding land titles. The Colombian Government owns title to all subsoil rights, except in those cases where private owners have titles predating October 28, 1873. But even in the case of ownership titles prior to this date it is often found that boundary lines are indefinite, causing additional delays before oil companies start drilling. One major oil company had to clear titles to a Colombian concession back in 1520—just 28 years after Columbus

Colombia's new president, Dr. Mariano Ospina Perez, seen in center of the accompanying photograph, is an engineer of long standing, and has had considerable experience as counselor on economic matters in various departments of the Colombian Government. He attracted attention of oil men some months ago when he sought a depletion deduction for income-tax purposes, as against the percentage basis now in force. In one of his first statements since his election May 6, Dr. Perez declared that his international policy would be substantially the same as his country has followed in the past, adhering to and respecting the pacts signed in Mexico and San Francisco. Dr. Perez is shown here being greeted on his arrival at Washington by Assistant Secretary of State Spruille Braden, right. On the left are Colombian ambassador Carlos Sanz de Santamaria, and Senora Perez, wife of the new president

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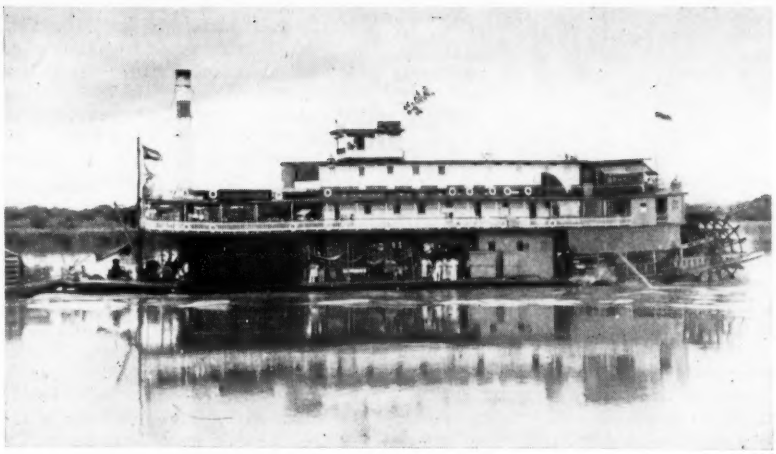


The Magdalena River is the principal artery for transporting oil equipment into the interior of Colombia. Here is a typical river boat

discovered America. And it is not at all rare for titles to be traced back 300 years.

While it is true that there have been certain advantages to drilling on property with clear private rights (that is, with titles predating October 28, 1873) this will no longer hold if the proposed petroleum law is passed, for this law will provide that royalties cannot be less than the difference between the tax on private oil and the government royalty. Previously, the government held no strings on drilling on private property and the deals were purely between the private owner and the oil companies. But companies will enjoy no advantage, if the proposed oil law is passed, in seeking property whose titles predate October 28, 1873.

Among certain advantages which will accrue to the oil companies under the proposed law, is that concessions could be relinquished without drilling and without being subject to forfeiture. Under current conditions if a grant is not exploited after a certain length of time it is subject to surrender. For instance, in March a 100,000-hectare San Jose track in the Llanos area just east of the Chafurray block and belonging to a subsidiary of Richmond Petroleum Co. of Colombia, was abandoned as expected. However, the ministry of petroleum indicated that the government would not accept surrender of this concession unless lack of oil was definitely shown by drilling. In other words, in addition to geological and geophysical work, the drilling of at least one well was held necessary.

The government's decision was based on the interpretation of Article 24 of the 1931 oil law which "permits" surrender of a concession any time during the exploratory period if it is shown that oil has not been found in commercial quantities.

Other advantages which would accrue to oil companies doing exploratory work in Colombia, under the proposed oil law are:

1. No congressional approval would be necessary for concessions over navigable rivers and in reserve zones.

2. No limit to the number of concessions which any one company might hold. Thus, the need for numerous subsidiary companies, to obtain new concessions, would be obviated. At present companies are limited to 200,000 hectares.

3. If no opposition is filed, within 3 months after acceptance of an oil company's application to a certain concession, it would be assumed that the subsoil rights constituted "baldio"—that is, that the property is public land.

4. Once a contract had been signed, its validity could not be challenged by a presumptive private owner. In other words, during the 3-month notice of intention to explore it would be a case of "speak now or forever hold your peace," a situation which does not now exist, and a situation which has resulted, in some few cases, in considerable legal difficulty.

Moreover, the proposed law provides that in areas west of the Cordilleras, drilling obligations would not have to be carried out for 3 years, instead of 2½ years as at present. However, in areas east of the Cordilleras, drilling would have to start in 4 years instead of 4½ as at present.

Regarding extension of exploitation periods, in areas west of the Cordilleras, there would be an initial 4-year period which might be extended an additional 3 years; at present there is an initial 3-year period which may be extended 6 more years. In areas east of the Cordilleras, there would be an initial 5-year period, capable of being extended 4 more years; at present there is an initial 5-year period capable of being extended 6.

In an interpretation of Colombian oil laws, made late in May, the ministry of petroleum concluded:

1. The oil law obliges the operator to maintain only a single drilling rig in operation, even during the renewal exploratory periods, although the exploratory program may call for the spudding of at least two wells dur-

Temporary camp in the interior of Colombia

XUM

COLOMBIA'S OIL-CONCESSION ACTIVITY

Year—	1939	1940	1941	1942	1943	1944	1945
Number bids filed	32	8	11	13	78	123	87
Number bids accepted by ministry	24	6	11	6	21	58	19
As of December 31 (number filed)	97	105	116	129	207	330	417
Cumulative area of bids filed (million hectares)	2.7	3.7	4.3	4.6	5.2	9.8	16.0
Concessions granted	9	7	1	1	5	6	5
Total concessions granted as of December 31	21	28	29	30	35	41	46
Surrendered (total end year)	4	7	9	12	15	18	22
In force (total December 31)	17	21	20	18	20	23	24

ing the year. This appears to afford some relief.

2. Structural drilling is not acceptable in fulfilling drilling obligations. Presumably, this refers to core holes or shallow wells in lieu of a real test for production.

3. Thirty days prior to spudding "any well," the ministry must be advised. This includes structural, water, and wildcats.

4. Structural holes may be drilled at less than 100 meters from a concession boundary.

The concession table reveals an efficiency of about 5 per cent. The area of the 417 bids is 16,000,000 hectares, whereas the area of the 24 grants in force totals only 1,883,702 hectares, which is 11.8 per cent of the area for which applications have been filed.

Of the 24 grants in force, during 1946, 6 may be expected to be surrendered, thus leaving the operators with 18 concessions which is the average number of blocks, from 1939 to 1943, where exploratory drilling could occur. In other words, the oil industry in Colombia is about where it has been for the past 6 years, notwithstanding capital investments totaling $22,000,000 in 1944 and $32,000,000 in 1945.

The oil industry's total capital assets in Colombia are now $102,000,000, or about 178,413,174 pesos. However, United States oil men operating here indicate that although there was hope, at one time, that Colombia would pattern its revised petroleum law after Venezuela's, it is still believed that the oil outlook is reasonably good.

A.P.I. Agriculture Group Studies Activity Program

CHICAGO.—The petroleum industry's relationship to agriculture—present and future—and projects of benefit to both, were studied in a 2-day meeting here last week of the newly organized agricultural development committee of the American Petroleum Institute.

The committee recently expanded to 21 members to be representative of all geographical sections and phases of the oil-farm relationship, mapped plans for its program and heard a number of speakers discuss various problems and trends in its field.

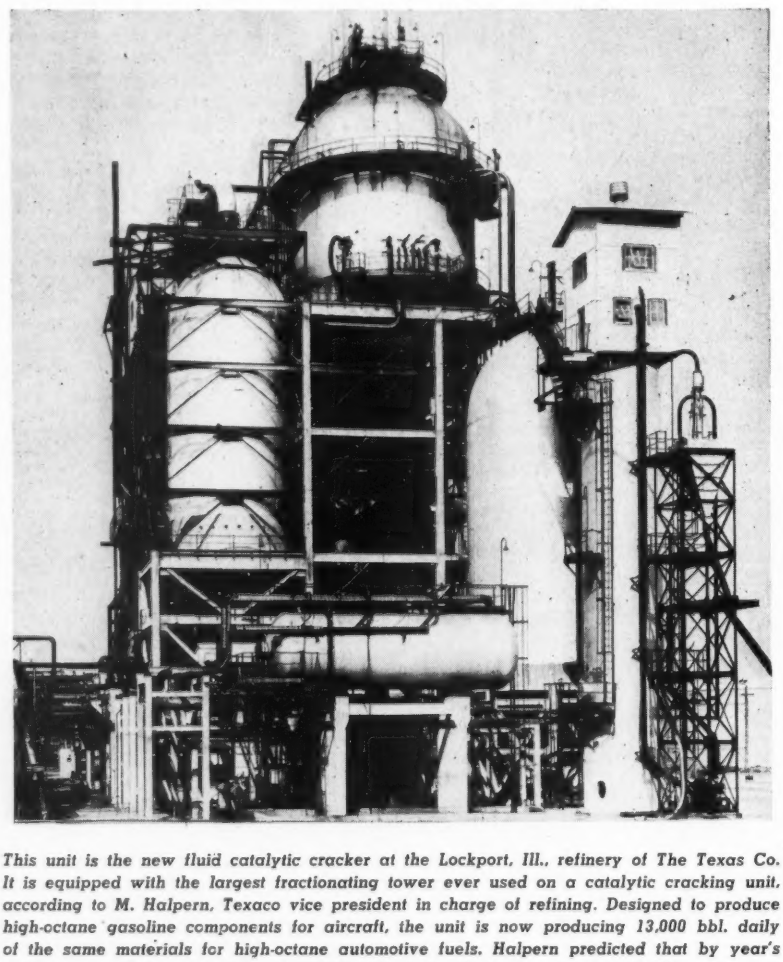
Howard E. Everett, editor of the Implement and Tractor Trade Journal, told the group that power farming is in its infancy and predicted tractors of the nation's farms will reach a total of 3,000,000 by the end of 1948. The development of the small tractor is regarded as an important factor in the future demand for petroleum products, despite previous beliefs that extension of mechanization to small farming units is not economical.

The committee selected Chicago as its permanent headquarters and decided to present a specific program for authorization by the A.P.I. board of directors at its meeting June 25-26 in Dallas. The group also discussed such possibilities as extending the committee's work through the farm contacts of the tank-wagon salesman—a frequent farm visitor—research in petrochemistry of benefit to agriculture, including insecticides, fungus control, and weed killers, and promotion of farm safety in cooperation with National Safety Council.

Pacific Western Acquires George Getty Properties

JERSEY CITY.—At a special meeting, stockholders of Pacific Western Oil Corp. approved the merger of George F. Getty, Inc., into Pacific Western, adding some 250 wells and 3,400 bbl. daily crude output to Pacific Western's present production of approximately 10,000 bbl. daily.

Getty's holdings of about 250,000 acres include production acreage in California, Kansas, New Mexico, Texas, and the Rocky Mountain area. Also included are 327,754 shares of Tide Water Associated Oil Co. stock.



This unit is the new fluid catalytic cracker at the Lockport, Ill., refinery of The Texas Co. It is equipped with the largest fractionating tower ever used on a catalytic cracking unit, according to M. Halpern, Texaco vice president in charge of refining. Designed to produce high-octane gasoline components for aircraft, the unit is now producing 13,000 bbl. daily of the same materials for high-octane automotive fuels. Halpern predicted that by year's end output will be pushed up to 20,000 bbl. daily. High as a 12-story building, the unit is operated on a 24-hour continuous schedule, shutting down only once a year for a brief inspection

FPC Natural-Gas Investigation Enters Its Final Phase

WASHINGTON.—The Federal Power Commission's natural-gas investigation entered its final phase here this week with the opening of the eighth series of public hearings, scheduled to run 5 or 6 weeks.

The opening day was devoted almost entirely to representatives of New York Public Service Commission, who put in the record voluminous statistics on gas production, transportation, and use in that state. The state officials declined to draw any conclusions from the figures and did not express any views on the importation of additional gas from other states nor on the respective jurisdictions of state and federal commissions.

Another witness was Warren N. Watson, secretary of the Manufacturing Chemists Association of the United States, who described the many synthetic organic chemicals which may be made from natural gas and told of the recent rapid growth of that industry. Natural gas and its components are of greater importance as raw materials than they are as a simple fuel, he said, pointing out how many valuable chemicals can be extracted from natural gas without reducing its heating value materially. He added:

"The chemical industry is dependent upon natural gas as one of its most important sources of raw material, and the natural-gas industry has in the chemical field one of its most important and rapidly expanding customers, and certainly one in which the natural gas consumed is utilized with high efficiency in maintaining the economic prosperity of the country. In the development of natural-gas reserves of the United States the importance of natural gas to the chemical industry as a source of raw material should be fully recognized. It is sincerely hoped that those who engage in the future development of these reserves will give appropriate consideration to this very beneficial use, which enables a more complete utilization to be made of a resource which in years gone by has not been conserved too efficiently."

On crossexamination Watson admitted that the quantity of natural gas used in chemicals manufacture is very small compared with other uses and that so far as the gas industry is concerned chemicals manufacturing is just one more use along with many others.

The main presentation of the natural-gas industry committee is scheduled to start the week of July 15, but some of its witnesses will be put on from time to time to fill gaps in the schedule. Other witnesses slated for this week include Dr. W. K. Lewis, professor at Massachusetts Institute of Technology; Dr. P. C. Keith, president of Hydrocarbon Research, Inc., and officials of the Interior Department. Most of the next 2 weeks will be given over to spokesmen for various coal, railroad, and labor groups.

The Independent Natural Gas Association of California announced this week it has decided not to make an appearance or offer testimony at the "inquisitional" hearing in Washington.

"A place was reserved for us on the agenda for July 9, but we have wired our regrets," said Rush M. Blodget, secretary. "The executive committee feels that if and when FPC goes to Congress and asks for 'more power,' our efforts can be directed to the issue thus created, for none exists except the ambitious attempts of FPC to encroach upon free enterprise in the oil industry and supplant state rights with federal bureaucracy."

Brisk Offseason Demand for Burning Fuels

by Dahl M. Duff

WHILE mid-west tank-car gasoline prices moved up to only a fraction under ceiling, petroleum markets this week found buyers eagerly seeking kerosene and distillate burning oils in strong off-season demand.

The demand for kerosene and distillates apparently stemmed from a desire of buyers to stock up on the products in advance of next winter's heating season and also from the belief that removal of ceilings or a price advance is imminent.

In New York, reports showed kerosene still tight with suppliers continuing to fill storage and many anticipating price decontrol. Residual showed some signs of easing, although some New York market observers believe it will be tighter next winter than last.

Marketers quotations for kerosene on the Group 3 basis ranged upward from 4.5 cents for both 41-43 and 42-44 grades. Refinery quotations ranged ¼ cent or more higher. Sale of 100 cars of range oil only ⅛ cent below ceiling was reported.

Most gasoline on the Group 3 basis was going at 5⅞ cents to the ceiling of 6 cents. Some smaller quantities were moving at 5¾ cents, but the market continued strong as the larger companies sought to augment supplies. The likelihood of removal of price controls also appeared to be influencing the market to some extent.

In New York, the gasoline was reported somewhat weaker with many sales below ceiling. In California, the picture of gasoline supplies brightened. The draft of Pacific Coast stocks that has continued almost uninterrupted since 1941 halted, and refined products are now building up at a fast rate. The rise in stocks appeared to be due to a slightly increased production and to a drop in bunkering business starting late in March.

Throughout the country, statistical reports brought fresh indications of mounting gasoline consumption. Daily gasoline demand in the week ended June 8 increased 22,000 bbl. to a total of 2,138,000 bbl. Gasoline stocks declined more than 1,000,000 bbl. for the seventh time in the last 10 weeks and stood at 94,146,000 bbl.

Crude stocks during the June 8 week took their sharpest drop in 22 weeks. Inventories declined 2,296,000 bbl. to 218,589,000 bbl. The decline was made up of a 2,421,000 bbl. drop in domestic stocks and an increase of 125,000 bbl. in foreign stocks.

American Petroleum Institute statistics based on state tax and inspection reports showed gasoline consumption in the United States during March at 74,429,000 gal. daily—an increase of 6.61 per cent over March 1945. In the first 3 months of 1946, consumption averaged 69,916,000 gal. daily against 66,392,000 gal. daily in the corresponding 1945 quarter—an increase of 5.3 per cent.

Texas Underproduction Averages 6.8 Per Cent

AUSTIN, Tex. — Texas' estimated April production of 60,810,757 bbl. fell short 6.8 per cent, or 4,398,624 bbl. of the full allowable for the month, according to the Texas Railroad Commission. Highest percentage of underproduction was 17.6 in North Texas, while the lowest percentage of underproduction was 2.4 in East Texas.

XUM

WASHINGTON WATCHING

BY HENRY D. RALPH

New Moves for Decontrol

WASHINGTON. — A flat provision that price controls must be removed from petroleum and petroleum products not later than June 30, 1946, was contained in the price control bill as it passed the Senate last week.

The bill is now in the hands of a conference committee for adjustment of the conflicting provisions of the House and Senate versions. Both houses must adopt the conference report before the measure goes to the White House.

Oil is the only nonagricultural commodity specifically named for automatic decontrol in either version of the bill. For this reason it would not be surprising if the provision is dropped during the conference proceedings, since it may well be used as "trading stock." The Senate conferees may agree to surrender it in exchange for House acceptance of some other Senate provision.

However, both House and Senate bills have such sweeping decontrol provisions that the final measure inevitably will provide machinery whereby petroleum price ceilings will either be eliminated or greatly raised within a short time. The conference committee may accept either House or Senate decontrol sections or evolve a compromise, but the rewritten provisions must be neither more nor less embracing than the version passed by either chamber.

The principal decontrol provision of the House bill requires that price ceilings must reflect the current cost of producing, processing and distributing plus a reasonable profit, and that controls be removed from any commodity when production equals or exceeds the 1941 rate.

Requirement of Bill

The Senate bill requires prompt removal of price controls from any commodity whenever the supply is in approximate balance with the demand for it. It also creates machinery whereby industry advisory committees can petition for decontrol of a commodity meeting the standards of the act; OPA must answer in writing within 15 days, and if the answer is not satisfactory the committee may get a hearing before the administrator in 10 days; if the result is still unsatisfactory the committee may appeal to the Price Decontrol Board (a new agency independent of OPA) which can order OPA to remove controls.

These and other provisions of both House and Senate bills clearly reflect a congressional conviction that OPA has been prone to stall decontrol with lame excuses and to hang on to controls by delaying actions. It is hard to see how oil price controls could be retained long under any decontrol formula within the power of the conferees to formulate.

Following the conference report on the bill there remains the question of what action the president will take. Many of his advisers will urge him to veto it in the hope that Congress will quickly enact a less drastic measure or adopt a resolution continuing the present law in effect for a limited period beyond its expiration date of June 30. However, the large majorities which the bill received in both chambers suggest that the bill might be passed over a veto, or that, if a veto is sustained, a majority of both houses could not be obtained for a measure continuing the present law.

In the latter case there would be no OPA and no price controls whatever after the end of next week.

Stripper Subsidy Prospects

THE stripper well premium price subsidy plan appears to be doomed under the Senate version of the price control bill. The bill authorizes expenditure of $969,000,000 for existing subsidy programs for petroleum, sugar, flour, and other materials (except rubber, lead, zinc, copper and tin which are treated separately), with these restrictions:

They shall be progressively reduced and shall be terminated not later than May 1, 1947, and shall not cost more than $629,000,000 during the last six months of the calendar year 1946;

Subsidies shall not be paid on any commodity not subject to price control;

No new subsidy program may be started, and no increase may be made in the rate of any subsidy;

When any subsidy is reduced or terminated, any maximum price applicable to the product must be correspondingly increased.

A further provision authorizes the payment of subsidies to fulfill obligations incurred prior to July 1, 1946, with respect to operations prior to such date. Therefore, if petroleum price controls are lifted on June 30 the stripper well subsidy will end on that date, but payments will be made for June production.

A number of stripper well operators have been active in attempting to work out some plan for continuance of the premium price plan independently of price controls, but to date no satisfactory plan has been evolved, and it appears unlikely that action can be obtained before oil price control passes into the limbo of forgotten things.

Leasing Bill Clears Senate

WITHOUT a word of discussion the Senate passed the Hatch-O'Mahoney bill (S. 1236) to liberalize the leasing act with respect to development of oil and gas on the public domain.

The bill now goes to the House, where the public lands committee has already held hearings on a somewhat similar bill, so passage by that body before adjournment is rather likely.

The course of this legislation well illustrates the way the Senate frequently legislates. Bills to liberalize the leasing law have been pending for several years, and oil and gas associations throughout the public lands states have been very active in seeking their adoption. The Senate public lands committee obtained a special appropriation to make an investigation, and held a series of hearings in several western cities last year. This spring it held a week of additional hearings at which Interior Department officials raised strong objections to many provisions, while industry spokesmen asked even greater liberalization.

Less than 3 weeks ago the committee reported out an entirely rewritten measure, ignoring many of the requests of both sides to the controversy but generally in line with the industry's desires. After spending many weeks in lengthy debate over labor, draft, and price control legislation the Senate, late last week, decided to clean up its routine calendar, and passed several dozen minor bills in 1 day. When the oil leasing bill was reached, it was adopted by unanimous consent without so much as one word of explanation by its authors.

Status of the Oil Treaty

SENATE action on the Anglo-American petroleum treaty is a 50-50 chance. The State Department wanted to defer consideration until Congress completed action on the British loan legislation, and that took a lot

longer than expected. The bill has passed the Senate and is up for consideration in the House this week. As soon as it is out of the way the State Department will be ready for hearings on the oil treaty.

But Chairman Tom Connally of the foreign relations committee is again in Paris advising Secretary of State Byrnes at the meeting of the "Big Four" foreign ministers, and if it takes the conference as long to agree to disagree this time as it did at the last conference, the Senator will barely get back to the United States in time to get home for the Texas primaries in which his seat is at stake.

Of course the foreign relations committee could hold hearings without its chairman if he gave it the go-ahead signal, but since he represents the leading oil-producing state he ought to be there. With Congress now aiming for adjournment around August 1, the Senate won't have much time to work on the oil treaty, and it might easily get shoved aside if sufficient opposition develops to produce lengthy hearings and involved debate.

Antitrust Enforcement

A VIGOROUS campaign to enforce the antitrust laws by breaking up large integrated companies was pledged by Atty. Gen. Tom C. Clark in asking the Senate appropriations committee to increase the funds for the antitrust division.

"No task among those with which I am charged under the laws of Congress is more important in this immediate postwar period than the vigorous enforcement of the antitrust laws," he told the committee. "A careful examination of the interlocking controls of industry convinces me that the evils which the antitrust laws were designed to eliminate have been permitted to grow to gigantic proportions. . . . Both actually and potentially the threat of abuse of industrial power is greater today than at any time in our history. . . . Many of the great business enterprises of the nation have developed the skillful technique to circumvent the Government's antitrust enforcement. . . . Today, the payment of fines in a criminal suit is considered by many corporations as a part of the fixed expense of doing business. In other words they consider the fine a license fee to continue the illegal practices. . . . The consent decree has become a standard corporate form. Our funds are not sufficient to enable us to police the innumerable consent decrees entered into and thus they are, for the most part, ineffective.

"The times require that where the elimination of competition is threatened or actual that it be restored by the seldom used processes of divesture, divorcement, and dissolution. The use of all of these weapons of enforcement will establish complete and independent units of enterprise which can and will, in fact, compete one with the other. This is the only way to maintain free enterprise. If given sufficient funds, I propose to immediately and vigorously move to that end."

The Tidelands' Resolution

DEFENDERS of state ownership of submerged oil lands are hoping that Sen. Pat McCarran of Nevada will soon find a propitious moment to call up in the Senate the pending House resolution renouncing all federal claims to such lands.

Should this resolution get through before adjournment, it would pull the rug out from under the Justice Department's suit against California, which the Supreme Court has now set for argument next October. The suit asserts that title to offshore oil lands has never been determined, even though all states have assumed that the title was theirs, and the department asks the court to declare that the federal Government has jurisdiction over oil leases off the southern California coast.

California has answered the suit with a strong denial that there is any doubt of the matter, citing some 50 court decisions which it claims affirm state ownership of all such underwater property. The state has asked the court to appoint a special master to take testimony, a procedure which might involve years, but if the court hears arguments on the merits of the case next fall the issue might be decided before Congress meets again.

Passage of the resolution may be eased somewhat by the action of Sen. Joseph C. O'Mahoney of Wyoming in offering an amendment which would not affect state claims to submerged lands out to the 3-mile international limit but would reserve to the federal Government all claims to the continental shelf lying farther out to sea.

Rubber Plants on Block?

THE entire government-owned synthetic rubber industry may be offered for sale to private industry in the near future if Congress fails to disapprove reports being submitted by War Assets Administration.

Last week WAA proposed immediate sale of all butyl, neoprene, styrene, furfural, and carbon-black plants built by the Government as parts of the synthetic rubber program, following the recommendations of the inter-agency policy committee on rubber. This week the policy committee recommended that the butadiene and copolymer plants also be offered for sale, under certain restrictions, and WAA was preparing a proposal to this effect which was scheduled to go to Congress this week. Unless Congress takes adverse action within 30 days WAA will be free to advertise for bids this fall.

The policy committee suggested that a distinction be made between basic and fringe copolymer and petroleum butadiene plants. The fringe plants, being high cost or poorly located, could be offered for sale without restriction and closed down as need for their output ceases with higher imports of natural rubber. The basic plants would be sold on condition that they continue operation as long as needed and thereafter be kept available for rubber production in time of emergency. The basic plants have a capacity of about 450,000 tons and the report recommends that the sale contracts insure that at least 250,000 tons of synthetic rubber be produced annually at all times. Basic plants not sold now would be kept by the Government in standby condition but not operated after the present rubber shortage is ended, though they would be available for sale at any time.

All three alcohol butadiene plants should be offered for sale now, the committee recommends. But one of them should be sold on terms requiring it to be reconverted to butadiene production in time of emergency.

War's Effect on Oil

THE effect of the war on the petroleum industry is well summarized in a report issued this week by the U. S. tariff commission, one of a series on war changes in leading industries prepared at the request of congressional committees.

No recommendations and no conclusions are contained in the 150-page booklet prepared by Donald W. Bell and other members of the commission staff, but the report is a useful handbook of statistics and information on current conditions and past trends in the oil industry of the world. It summarizes impartially various views on such controversial subjects as conservation, imports, exports, tariffs, gasoline taxes, prices, the position of major companies, and suggestions for government subsidy of wildcatting and stripper wells, and quotes a number of forecasts of future reserve discoveries, production, demand, price, and relative importance of U. S. and foreign oil industries.

Particular attention is given to wartime demand for petroleum, the increase in production, decline in new discoveries, and investment in wartime facilities in the industry. Greatest space is devoted to description of

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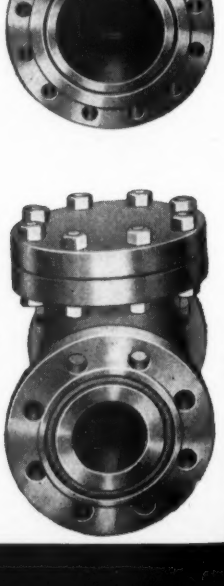

RING JOINT

PACIFIC VALVES
CAST STEEL

the oil industry in foreign countries and the effects of the war, U. S. interests abroad, international petroleum trade, U. S. imports and exports, and the history and effects of the oil import taxes.

A particularly useful section described the foreign oil interests of all American companies and the extent to which U. S. companies act jointly in foreign ventures, together with a listing of subsidiaries operating abroad owned jointly by several U. S. companies or by U. S. and foreign companies.

OGD Looking Up

WHAT looked like a threat to the successful launching of the Oil and Gas Division and the National Petroleum Council ended up in a love feast Monday at a special hearing of the Senate committee on petroleum resources.

When Chairman O'Mahoney called the hearing late Friday rumors went around oil circles in the capital that something might be brought out which would jeopardize the OGD appropriation, now pending in the Senate, and prevent Acting Director Ralph K. Davies from issuing the call for the first council meeting.

However, the only development was assurance from Davies and Under Secretary of the Interior Oscar Chapman that they have no intention of doing anything not authorized by law. O'Mahoney said he wanted to clarify the aims, purposes, and methods of OGD, the extent to which it proposed to centralize the Government's oil activities, the extent of industry participation in government functions, method of selecting members of the council, representation of independents versus major companies, and how far the council will go in setting government policy.

Davies' explanation apparently satisfied the chairman. He closed the hearing by saying some time it may be necessary for his committee to draft a statute setting up a formula for council membership and outlining its functions, but at present he saw no need for interfering with reorganization and coordination of activities within the Interior Department.

Regarding policy, which O'Mahoney kept saying is a function of Congress, Davies and Chapman said the council will only make recommendations to the Secretary of the Interior regarding legislation or administrative actions. As to centralization they promised that instead of concentrating all government activities in Washington they would seek to place more responsibility in field offices.

O'Mahoney apparently was disturbed by Davies' testimony last week before the Senate appropriations committee where he visualized that eventually virtually all federal activities relating to oil will be brought into OGD, but at this hearing Davies' ambitions appeared much less expansive. He explained that many oil matters, such as taxation, could never be separated from their present bureaus, and he promised that no federal functions could be transferred to OGD from other agencies except through the established procedure of the reorganization act where a presidential plan is first submitted to Congress.

The purpose of the council, Davies said, is to provide a two-way channel of contact and information between Government and industry to prevent misunderstandings and mistakes. The council, as he outlined it, will have no powers to make the industry do anything but should be of great help in advising interior officials and any others who care to seek its advice. Its initial membership will be chiefly based on Davies' own knowledge of the men in the industry, but others will be added later if the industry desires. He promised that the industry will be pleased by his selections, that the new council will be dominated by independents and minor companies, and that it will not have the complaints and criticisms which were leveled at Petroleum Industry War Council.

Members of the Army-Navy Petroleum Board strongly endorsed the council idea, but officials of other government agencies present declined comment when called on by O'Mahoney. The Department of Justice did not make an appearance, and the subject of antitrust was never mentioned. Several oil-industry trade-association representatives present in the audience were called on by the chairman and they expressed the hope that independents would be adequately represented and that the new agency will not continue wartime controls. William R. Boyd, Jr., president of American Petroleum Institute, who has been notably cool to the council idea, was not present at the hearing, a fact which caused Chairman O'Mahoney to express surprise.

Hearings Scheduled On Texas' MER

AUSTIN.—The Texas Railroad Commission will hold several hearings this summer, starting July 23, to determine new maximum efficiency rates of withdrawal from the state's oil fields.

The commission estimates more than 2,000,000,000 bbl. of crude have been produced since the last similar hearings in 1943, and discoveries are reported to have increased the state's reserves beyond that amount. Many fields have increased their reserves by additional drilling to more than offset the amount of oil produced, commission officials said.

The commission suggested that operators in each field confer so that data on reservoir pressure, gas-oil ratio, water produced and periodic rate of oil production during the preceding 4 years, may be assembled and presented for reservoirs as a whole rather than for particular leases.

It was also suggested that one operator in each field submit the data for the entire field. Each operator, however, is allowed to submit his own recommendation as to the most efficient rate of production from any particular reservoir or field.

On July 23, the hearing will cover fields in District 2, embracing Goliad, Refugio, Karnes, Bee, Victoria, Jackson, Calhoun, and Live Oak counties. A hearing set for July 25 involves 11 fields in McMullen, Atascosa, Guadalupe, Bastrop, Frio, and LaSalle counties of District 1. The District 3 hearing will include 111 fields in the following counties: Galveston, Jefferson, Fayette, Harris, Matagorda, Fort Bend, Brazoria, Tyler, Chambers, Liberty, San Jacinto, Montgomery, Wharton, Colorado, Polk, Austin, Hardin, Waller, and Orange.

DEATHS

George C. Gibbons, 57, executive vice president of the Texas Mid-Continent Oil and Gas Association, died June 13 in Dallas. Well known in the industry, Gibbons had been particularly active in the wartime oil program. His services to the Petroleum Industry War Council and the War Production Board brought official citations from both agencies. He became executive head of the Texas association in 1936.

Edwin S. Anderson, 59, Tulsa district manager for Lee C. Moore & Co., derrick manufacturing firm, died June 16 at his home in Tulsa.

J. H. Ragland, 67, pioneer Oklahoma oil lease dealer, died June 15 at his home in Tulsa.

Andrew P. McGlynn, 55, president of McGlynn Oil Co., died June 6 in Minneapolis.

Fred A. Book, 57, independent operator active in operations in Arkansas, Texas, and Louisiana, died June 10 in El Dorado, Ark.

H. C. Olcutt, 70, vice president and a member of the board of directors of Skelly Oil Co. until his retirement in 1937, died June 11 in Tulsa.

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GREAT STREAM OF PETROLEUM WOULD BE ONLY A TRICKLE —WITHOUT STEEL

Without steel, the great stream of petroleum that now flows full and strong to benefit mankind with its manifold products, might have remained the mere "rock oil" trickle it was in the pioneer days in Pennsylvania. Then, shallow wells were slowly "kicked down" by foot power, or drilled from little wooden derricks by small, steam-driven rigs with iron boilers, iron engines, handmade iron tools and other rudimentary equipment. Production was exciting, but very scanty compared with today.

Today, steel does the drilling. Across the continent and around the world, steel brings in the oil. From towering steel derricks with steel tools, drill pipe, casing, tubing, wire rope and rotary rigs, wells can be drilled three miles into the earth in less time than the pioneer rigs could make a hundred feet or so of hole.

Steel research, working with petroleum research, developed some marvelously tough, hard, strong steels for the big jobs in the oil fields. But when the wells of tomorrow go still deeper to swell the beneficent flow of the petroleum stream, there will be at hand still tougher, harder, stronger steels designed for the greater depths, the harder service. Such steels are being developed and produced by Jones & Laughlin Steel Corporation in the continuous improvement of its line of oil country goods.

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Early names for petroleum were Seneca oil, Genessee oil, fossil oil, rock oil.

For "kicking down" a well in pioneer days, a pole was placed over a log, the butt end pegged outside the derrick and drilling tools suspended near whip end inside derrick. Attached to tip of pole were stirrups in which two men placed a foot and "kicked" down. By repeating this procedure all day they could drill about 3 feet of hole.

Walls of Babylon, its palaces and temples were cemented with asphalt from the Fountain of Is, oil springs in Euphrates Valley.

Drake well museum and memorial park, maintained in Titusville, Pa., by the Commonwealth of Pennsylvania, is a rich repository of photographs, documents, papers, equipment and other memorabilia preserved from the days of the "oil excitement," touched off in 1859 by Col. E. L. Drake's discovery well which struck oil at 69½ ft.

Oil still taken out of Drake well is sold in 10-cent bottles to visitors for souvenirs.

20 ft. of iron pipe and a water pump was pumping equipment on first oil well. Today, special steel tubing in long lengths of great strength, such as J&L makes of Controlled Quality steel, withstands high pressures and "pull" of suspension in hole.

2 octogenarian wells still producing oil are McClintock No. 1, near Oil City, Pa., and Buell No. 1, near Macksburg, Ohio.

Early oil wells were started by digging pit within derrick. Then a "casing" (invented by Col. Drake) was put in to shut sand and water out of hole. It was usually iron pipe in short lengths connected by iron bands heated and shrunk onto the pipe. Today's wells are safely and speedily cased with long lengths of seamless steel pipe easily threaded or welded together. Hundreds of miles of casing are made yearly by J&L.

Sea grass rope, used on pioneer wells, was replaced by manila. But, not until development of steel wire rope, such as J&L Precisionbilt Oil Country lines, could oil and gas well drillers run heavy strings of tools without danger of losing them in the hole.

New J&L handbook of tubular products for oil industry containing many tables and other useful information may be had by writing on your business letterhead to Publicity Manager, Jones & Laughlin Steel Corporation, Pittsburgh 30, Pa.

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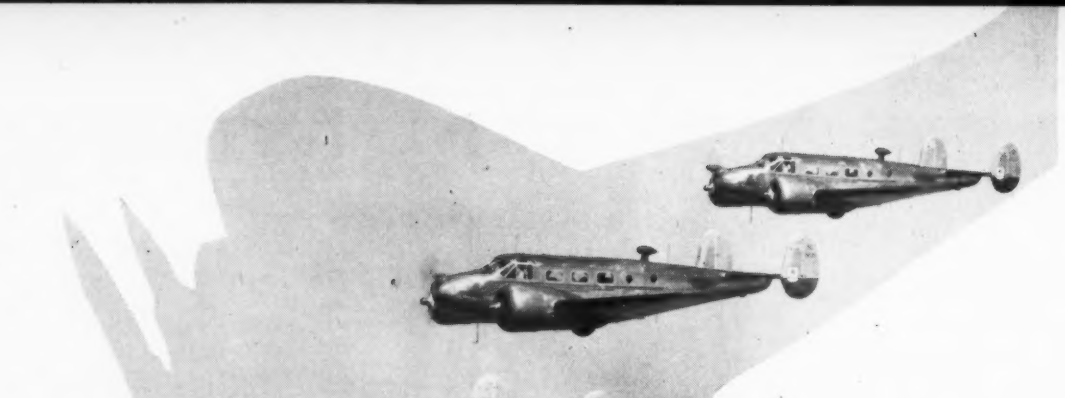


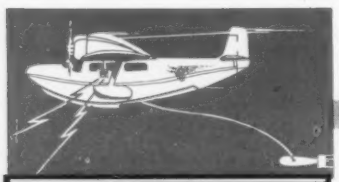
Magnolia Petroleum Co. plane and two of her sister ships of the Socony-Vacuum fleet represent one of the most popular types in use by the petroleum industry

by Herndon David

AVIATION *at Work*

A Special Section of The Oil and Gas Journal

Executive Transportation



Exploration

Drilling and Production

Equipment Transportation

Pipe-line Patrol

Marketing and Sales

THE petroleum industry is literally "taking to the air" as more and more companies and operators turn to aviation to provide a swifter and more efficient method of fulfilling their transportation needs. Operating around the globe, and often in places where distances are great and other transportation facilities inadequate or nonexistent, the industry is finding the plane indispensable as a means of transportation for both men and equipment.

Aviation made its first appearance in the industry more than 20 years ago when a few companies purchased planes largely as an advertising feature. As the design and safety of the airplane advanced, more uses were discovered and today the plane has become an everyday work horse, used extensively in every phase of the industry's operations.

Uses of the plane vary with different companies, but one use with almost all companies is the transportation of executive personnel and key employes who find it necessary to "get there in a hurry." Many of the companies maintain an aviation department solely for this purpose.

Top: The Gulf flying laboratory, used in testing of the airborne magnetometer
Right: Magnolia officials inspect new company plane. Left to right: L. H. True, S. A. Thompson, Wallace Hawkins, R. M. Chan, J. L. Latimer, E. D. Smith and Sam Willis
Below: Directors of Standard Oil Co. and subsidiary companies ready to take off on an inspection trip. Left to right: H. E. Hanson, E. F. Bullard, R. F. McConnell, M. G. Paulus, George Clarke, H. F. Clair, A. L. Solliday, R. O. Dietler, F. O. Prior, B. K. Brown, A. W. Peake, R. E. Wilson, L. C. Welch, B. F. Jones, V. E. Liles and C. S. Sanders

Performing Essential Services in the Petroleum Industry

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Above: Arabs inspect plane in use by Arabian American Oil Co. in Middle East

Left: Jimmy Doolittle takes delivery of a new plane which he will use as a flying laboratory for Shell Union Oil Corp.

Bottom: Pilot R. R. Roberts and the first of a fleet of planes with which Humble Pipe Line Co. initiated its plan to patrol its entire pipe-line system by air

Today the test applied to aviation in the oil industry is whether or not the extra cost of transportation is offset by saving in time. The steady increase in number of planes in use attests to the fact that time saving is becoming more and more important in petroleum operations. Originally the planes were used by executives who were able quickly to visit their operations scattered over several states. Now the various types of planes are utilized for transportation formerly dependent on motor vehicles and railroads. Experience has demonstrated the economy of the aviation operations and it is certain that this trend will be accelerated as postwar planes designed for specific uses are available.

The airplane has been particularly important in petroleum operations outside the United States. Chartered airplanes now regularly leave the United States carrying petroleum personnel and light equipment to the Persian Gulf area. Privately owned and chartered airplanes also make regular trips to South American and other points.

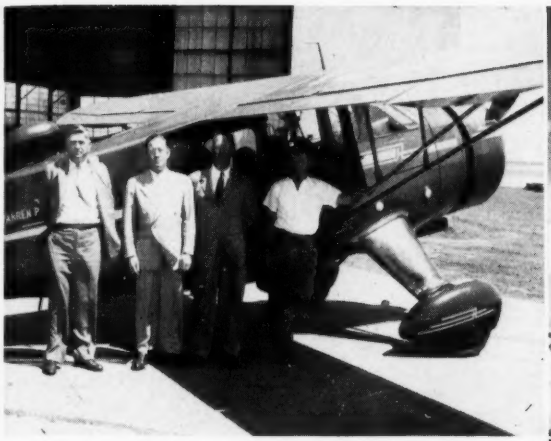
In the following discussion the various uses for airplanes in both domestic and foreign operations are outlined.

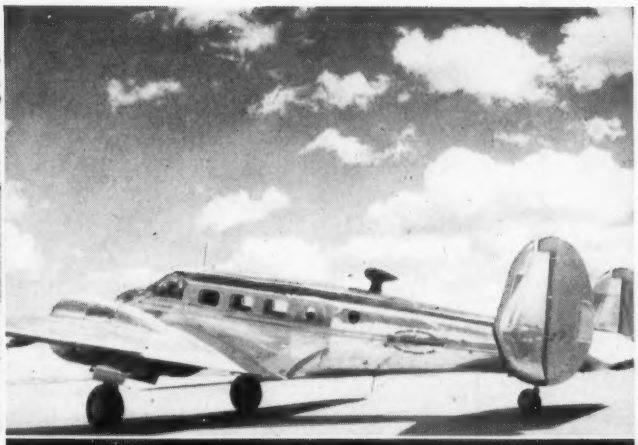
Exploration

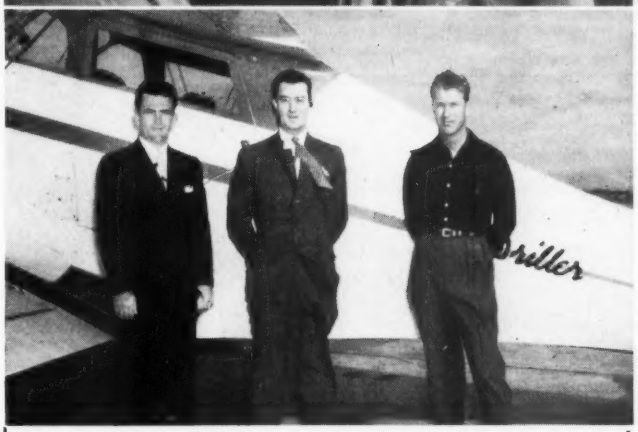
One of the first articles concerning the feasibility of using planes in oil exploration appeared in The Oil and Gas Journal as early as June 1925. For many years geologists have been flown into isolated areas where they could work only a short period out of the year on account of climatic difficulties. Surface transportation to the point of work and return to civilization in such cases would have required many weeks. Use of planes enabled geologists to do as much work in 1 year as they would have been able to do in 2 or 3, if surface transportation had been used.

Through the intervening years several other angles of exploration work have been slowly developing, with many of these due for considerable expansion by war inventions which are only now coming out from under the blanket of military secrecy.

Aerial photography, while too expensive for widespread use in most areas of the United States where leaseholdings were small, had become fairly extensively available to geologists through maps made by the government agencies dealing with soil control and associated activities. These maps usually were not ideally







Above: Warren Petroleum Corp. officials L. A. Boyd, C. H. Perry, L. M. Mauney, and pilot Ray Cook inspect a plane from the Warren fleet

Above, right: Plane used by drilling contractor Al Buchanan to supervise his widely scattered drilling operations

Right: Crew of engineers at work in Phillips Petroleum Co. flying laboratory

Right, below: J. C. Failing and E. L. Alexander, executives of George E. Failing Co., and pilot Harold Holden ready to take off on a business trip

suited to the geologist's needs, but being available cheaply, they helped considerably in some cases.

In foreign countries with large areas under concession, poor surface maps, and very little good surface transportation available, aerial photography for the geologist and geophysicist was economically feasible in far more cases and has been used extensively.

Use of planes in exploration work may be likened to improving a river for navigation. Over a period of years, many dams and locks must be built, dredging operations carried on, and navigation aids installed, with little or no increase in river traffic. But once the last link in the chain is completed, a very large increase in river traffic develops almost overnight.

The war has speeded up developments in aerial photography; and radar came into existence. Now it is revealed that the airborne magnetometer was perfected and used during the war. This combination, plus others that will probably come to light soon, may confidently be expected to bring about a relatively enormous expansion in the use of planes in oil exploration.

Trimetrogon aerial photography offers a cheap reconnaissance method of photographing large areas of land and examining the regional geology. With a comparatively small number of control points, a surprisingly accurate surface map can be prepared. Radar offers a detailing method of establishing accurate base lines, boundary lines, or networks of control points over an area covered by trimetrogon. The airborne magnetometer, with or without radar, according to the necessities of the local conditions, offers a cheap geophysical reconnaissance method to add to the surface geology revealed by photography.

The geologist can now fly over the territory in a conventional plane, studying the regional geology and picking up general impressions of local structures; combining visual observations with the photographs available; knowing that he can spot

(Continued on page 84)

The discussions of the various uses of aviation in the oil business were prepared by Herndon David, a district editor of the Journal's staff who has made a special study of developments in the aviation industry. He learned to fly while a student of the petroleum engineering school of University of Tulsa. He followed this with combat flying during the war, being credited with 32 missions in Europe as a pilot of a Flying Fortress.

XUM

Oil Industry One of Largest Users of COMMERCIAL AVIATION

Above: Busy airport exemplifies increasing demand of business personnel on commercial airlines for extended routes and stepped-up schedules. Right: Geologists of Creole Petroleum Co. arrive in the U. S. from South America to attend a conference. Plane was chartered from a commercial airline

by Henry D. Ralph

WASHINGTON.—The petroleum industry throughout the world is one of the largest users of commercial aviation. It was an enthusiastic supporter of the pioneering efforts to establish commercial transportation by air throughout the United States and when the first planes crossed the waters to other countries in the start of an international service, oil men accounted for a substantial per cent of the first passengers.

The reasons for the early acceptance of commercial aviation by operators are readily understood by those familiar with the oil industry's operations. Activities of the larger companies are scattered throughout the United States and in several cases throughout the world. Main offices are usually in the larger cities with field and plant operations located at numerous points in several states. The commercial services now available furnish transportation between offices and many operating centers.

This situation is further accentuated in oil operations outside the United States. Many of these oil activities are remote and before aviation services were available weeks were often required in transporting key personnel to refineries and fields located in the Middle East, Far East, South America, and other points. Now the global air lines connect to most of the principal cities and many of the oil-operating centers outside the United States. On some lines the oil industry furnishes most of the passengers, materials, equipment, and mail transported by air. The result is that the principal offices of the larger oil companies now have direct connections with their foreign operating points, and there is steady movement back and forth of key personnel.

Just before the war the scheduled airlines had 365 passenger liners in service, but at one time during the conflict the Army and Navy took nearly half of these for military service. Now these planes have been turned back and others have been acquired, so that at present there are 525 transport planes on scheduled passenger service in the United States and many more planes are on order, a large number of them much larger than the standard prewar model.

Before the war only one American company, Pan American Airways, had regular transocean service, flying to Europe, South and Central America, the Orient, and New Zealand. Now two other American com-

Domestic Airlines, With 70,000 Route Miles, Connect to All Parts of the U. S. A.

panies are flying to Europe regularly and authority has been granted for several other companies to establish routes to Mexico, South America, and the West Indies. Many other applications for foreign routes are still pending before the Civil Aeronautics Board.

Foreign countries are expanding their own air services just as rapidly, though in many instances they are awaiting the delivery of modern American equipment. There were local and international airlines in most parts of the world before the war, and these are being restored, extended, and reequipped. Many of these countries are planning, or have already started, long-range international commercial routes, and they particularly eye the huge American passenger business.

See Page 87 for map showing World Air Routes

British Overseas Airways Corp. now has scheduled service between London and Baltimore via Bermuda. The Swedish SILA line is starting service between Northern Europe and New York with the right to extend to Chicago. The Dutch KLM line, which maintained wartime service between Holland or England and the Netherlands West Indies via Africa, and between Curacao and Miami, has now scheduled regular flights to New York via the Azores and Bermuda. Air France has also been authorized to maintain transatlantic service to the United States, but flights have not yet started. Norway and Denmark have similar authorization and may set up a joint operation, possibly in connection with the Swedish SILA. Canadian and Cuban airlines also are giving service across our borders.

American airlines have been authorized by the Civil Aeronautics Board to serve many cities in Russia, Central and Western Europe, North Africa, the Middle East, and India, but service cannot start until the U. S. Government completes treaty negotiations with the nations concerned or until the companies have completed local arrangements for landing rights and airport facilities. One U. S. line now reaches Cairo, where it connects with British lines to South Africa, Singapore, and Australia.

In the Pacific, Pan American's prewar lines to Manila and New Zealand are operating but at the moment are restricted to military travel. Two companies have applied for routes to the Orient via Alaska, and a decision is pending before CAB.

Domestic Lines

Last fall the 17 domestic commercial airlines had 51,000 route miles on their scheduled runs, but now the figure is close to 70,000. During 1945 these operators flew 215 million revenue miles, carried 7.5 million passengers over 3,500 million passenger-miles, and carried 65 million ton miles of mail and 22.6 million ton miles of express.

To most people commercial aviation means the scheduled transport planes of the long-distance operators, but in addition there are the "nonscheduled" commercial planes operated for hire and the privately owned and operated planes used for company business or personal pleasure.

In preparing new safety regulations for nonscheduled commercial planes, to become effective August 1, the Civil Aeronautics Authority discovered that there are 2,700 such operators using 529 transport-type planes and about 5,000 smaller planes. Thus the nonscheduled business is far larger than the airline business, in number of operators and planes if not in such factors as revenues and miles flown, for which figures are not available.

The Civil Aeronautics Administration has an extensive program for improving facilities for both commercial and private fliers and for increasing the safety of air travel. Congress has just authorized a $500,000,000 airport construction program for the next 7 years, which must be matched by equal sums from states and cities. CAA is now maintaining 40,000 miles of domestic airways, equipped with lights and radio beacons, on which are 4,000 airports, more than half of them paved and equipped to assist in landing and servicing both commercial and private planes. The billion-dollar construction program will add some 3,000 more airports, most of them in the smaller cities, and will improve 1,000 others.

Commercial aviation is big business now, but recently the CAA made what it considers a conservative estimate of what it will be like in the United States in 1955. Here are some of the things it foresees:

About 400,000 registered civil aircraft, 280,000 of them for personal use, and 120,000 in business and commercial operations;

A fleet of 1,200 domestic scheduled air carrier planes conducting five times the present volume of business, and 330 planes engaged in international air carrier activity;

Manufacturing of 200,000 civil planes in 1955 to meet new, replacement, and export demands;

Some 6,300 airports to provide bases for these varied operations;

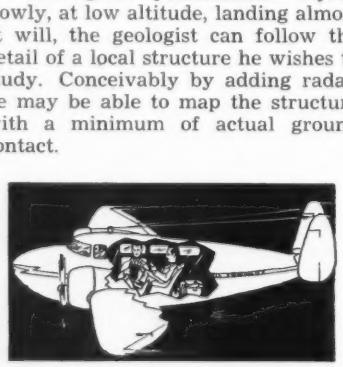
Direct employment of 600,000 persons in civil aviation, with another 400,000 persons getting indirect employment from the industry through supplying materials and services.

Aviation at Work

(Continued from page 81)

these accurately on a base map whenever he wishes.

In the follow up, or detailing after reconnaissance, the helicopter seems to offer great possibilities. Flying slowly, at low altitude, landing almost at will, the geologist can follow the detail of a local structure he wishes to study. Conceivably by adding radar, he may be able to map the structure with a minimum of actual ground contact.



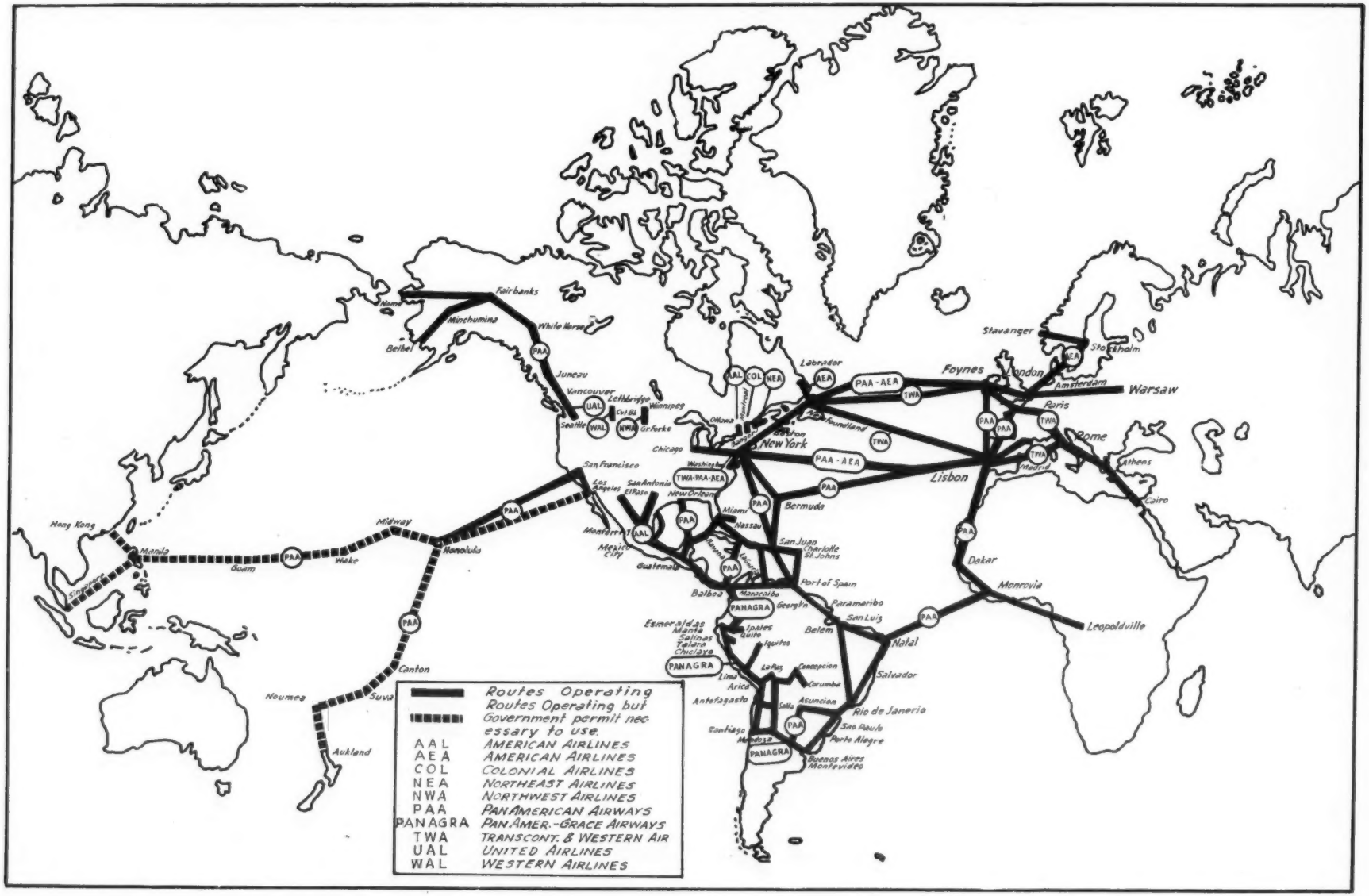
It seems no exaggeration to say that never before in history has it been possible for a geologist to get such a bird's-eye view of the regional geology, plus the local structure and its relation to the regional picture, and to transfer this information accurately to a base map, with permanent records including photographs to refresh his memory.

Drilling and Production

The greatest use of the plane in drilling is the transportation of supervisory personnel to and from the rig, thus permitting one man to visit several scattered rigs in the same day. It is also of great importance in getting emergency repair parts to a rig in the shortest possible time and preventing long and costly down time due to some simple mechanical trouble. A stitch in time often saves more than nine when a hole is on the verge of being lost. Getting the necessary fishing tool or fire-fighting crews and equipment to a well in the shortest possible time may mean the difference between successful completion of a well and junking the hole.

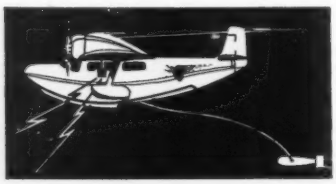
The experience of Al Buchanan, well-known drilling contractor, is representative of all contractors who have their own planes. He says: "I have been using a plane in my work

International Air Routes Are Undergoing Rapid Expansion



for 15 years. At present I have several rigs running in Florida and Southwest Texas and am moving into Louisiana. Having my own plane enables me to be on the job at least three times as much as if I had to go by car, train, or even by regular airlines, because I have rigs running in so many places that are not near airlines. Using my own plane, I can go from San Antonio to Florida in 1 day, whereas it would take 2 or 3 days by car or train.

"I usually clear off an air strip near wildcat locations in Southwest Texas so that I can land alongside the rig. Where it would take all day to visit one rig by car, I can make three or four rigs in the same day by plane. This also enables me to get to a rig quickly when necessary, for such things as a fishing job, coring, or bringing in the well."



The use of the plane in the production division of the petroleum industry is more limited, being largely confined to the transportation of consulting personnel or production executives and engineers on field trips. Aerial photography, however, is becoming more and more extensively used in making surveys of producing properties and even for such tasks as selecting the most desirable location for construction of access roads and making general camp-layout plans.

Equipment Hauling

The transportation of equipment for the petroleum industry in the United States by air is strictly a problem in the economics of air freight. Because of the weight of most equipment, the cost of air freight is prohibitive except in special instances. Small repair parts and emergency equipment can be carried economically by air freighters or even by company plane.

In remote locations such as the Florida Keys, or in the swampy regions of Louisiana, air transportation sometimes offers the only logical solution to the problem of getting many parts and supplies into the well site. In other sections of the country, however, where rail or truck facilities are adequate, air transportation of nonemergency equipment cannot possibly compete economically with other modes of transportation at the present time.

Future potentialities of air freight for the petroleum industry are very great. Improvements in planes designed especially for freight handling will bring additional operations into the realm of possibility. Notable among these may be such things as the supplying of remotely located warehouses by air freight.

One important use of the plane with regard to equipment is the transportation of equipment salesmen. In a few cases equipment manufacturers now supply each salesman with his own ship. These are usually light planes which can be landed alongside a rig without the necessity of clearing a landing strip. This allows the salesman to cover a larger territory and make a great many more contacts in a given length of time than he could by other methods of travel. Another program under consideration calls for the use of airplanes by supply companies in visiting their stores and warehouses scattered throughout the oil country.

Pipe Lines

The first use of aviation in the pipeline industry also dates back more than 20 years when experimental flights were made to determine pipeline routes. Since those first flights, aerial photography has become the primary method of determining the general route of any new long line, and lately the replacement of line walkers by patrol planes is becoming common.

The selection of a pipe-line right-of-way is dependent upon many factors, but topography, cultural and natural barriers are almost always the dominant ones. Every right-of-way buyer is familiar with the problem of dealing with a farmer after a ground-survey party has climbed his fences, walked across his fields, and chopped down the "old elm tree." By using aerial photography the preliminary line location is made in the engineer's office from photographs and the first contact with the land owner is made by the right-of-way buyer. This factor alone is of such economic importance as to preclude the possibility of attempting preliminary right-of-way location by the old chain-and-transit method.

Standard practice in producing a line aerial survey is for the plane to fly at sufficient altitude to photograph a strip of the country about 3 miles wide, which is usually sufficient coverage to get a location through. The pilot stays as close as possible to the center line of the desired route. The photographs are enlarged and assembled to give a continuous strip map of the country which the line is to traverse. This map can then be studied by the use of the stereoscope and other recently developed instruments.

By placing a thread along the map between the terminals of the line, the engineer can make a minute study of the country falling directly beneath and in close proximity of the thread. Advantageous changes become immediately obvious and moving the thread a slight amount in one direction or another will often eliminate difficult problems such as hazardous stream crossings and prohibitive timber clearing, and avoid orchards, houses, schools, churches, and graveyards.

Aerial patrolling of pipe lines is one of the more recent adaptations. The first aerial-patrol program was established in 1939, but due to the war it was not until 1945 that extensive use of the method was possible. During 1945 the number of companies resorting to the aerial line walker more

Loading freight into a Phillips Petroleum Co. plane used in regularly scheduled trips between Bartlesville, Okla., and plants in the Texas Panhandle

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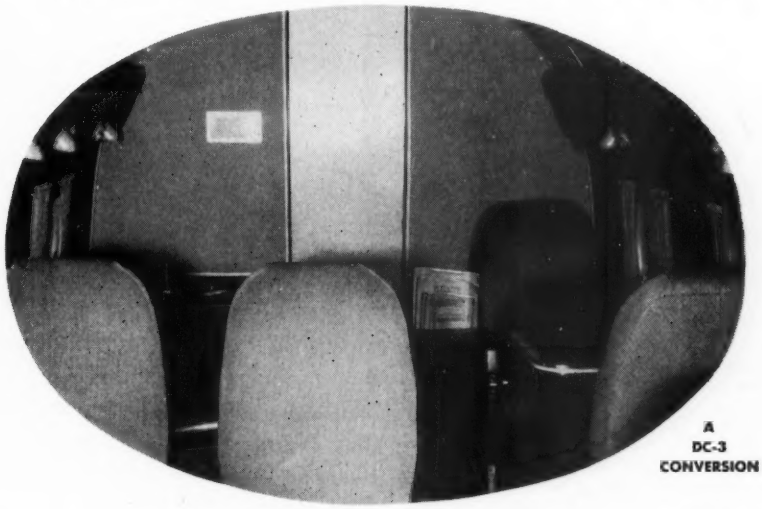

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than doubled, and indications are that this rapid growth will continue.

Air patrol enjoys many distinctive advantages over ground line walking. The observer's range of vision is greater, decreasing the possibility of missing leaks where the oil flows through a crevice before coming to the surface. There is opportunity for better observation of multiple lines in grass, cornfields, wheat fields or other places where a walker can accurately cover only a few feet on either side of his path.

Over rivers and lakes the aerial observer can easily see minute leaks that are almost impossible to detect from the bank or by boat. When the ground line walker's path is barricaded by swollen streams, the part of the line that needs patrolling worst often must be neglected. A plane can cover the line regardless of the conditions of the streams or the muddiness of the fields.

Air patrol is now being carried on either by company-owned planes or by independent contractors. The contract method has been the most common, but many companies are now considering establishing their own patrol organizations.

When the contract method is used, payment on a per-mile-of-line basis, usually about 20 cents, is specified. The minimum cost for a ground line walker is about 75 cents per pipe-line mile. Therefore, at 20 cents per mile, the plane can patrol a line four times per week for about the same cost as it can be covered once a week by a line walker. It would appear that air patrol is much cheaper, particularly if the patrol frequency desired is less than four per week. Usually, however, it is desirable to have four coverages per week, especially on old lines where leaks are frequent.

Pipe lines are easily followed from the air even though they have been in the ground for many years. Soil and vegetation discoloration mark its path clearly, and discoloration due to leaks is readily discernible. Leaks are found sooner, resulting in less oil lost. The most important factor is the time saving in event of a line break. The plane can cover the section in a matter of minutes, frequently locating the break before a repair gang can be assembled. Not only are there savings in man hours locating the leak, but there are savings in pumping time which are often of great value.

Erosion, road grading, pond building, and construction work, as well as tampering, are important factors to the pipe line, and many of these may be easily missed by the line walker unless they occur almost on top of the line. Experience has shown that in a given period of time the aerial patrolman will note many more reportable incidents, other than leaks, than a ground line walker, because he covers the lines more often and can see more.

Air patrol of pipe lines is still new and there are some disadvantages which are yet to be overcome. At present the patrolman must either drop messages at the pump station or wait until he lands to make his report. Use of two-way radio is now being planned by several companies to overcome this difficulty and increase the efficiency of air patrol. Sometimes it is difficult for the aerial patrolman to determine the kind and seriousness of leaks and ground repair crews may reach the scene improperly equipped. Experience should eliminate some of this trouble.

In the future the helicopter may provide the ideal means of pipe-line patrol, enabling the patrolman to land at any point to inspect a leak and to make emergency repairs. It may also be used to transport repair

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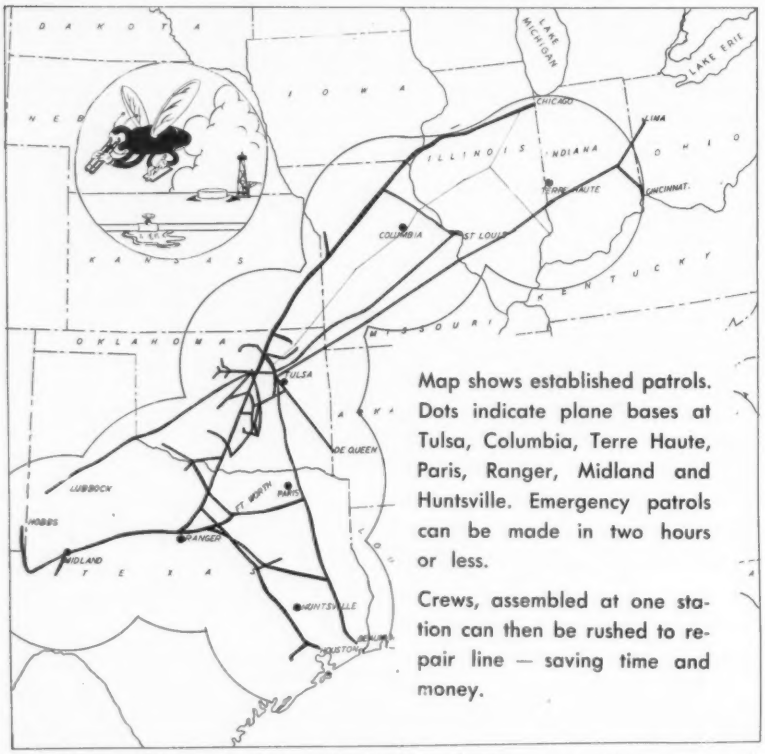

Map shows established patrols. Dots indicate plane bases at Tulsa, Columbia, Terre Haute, Paris, Ranger, Midland and Huntsville. Emergency patrols can be made in two hours or less.

Crews, assembled at one station can then be rushed to repair line — saving time and money.

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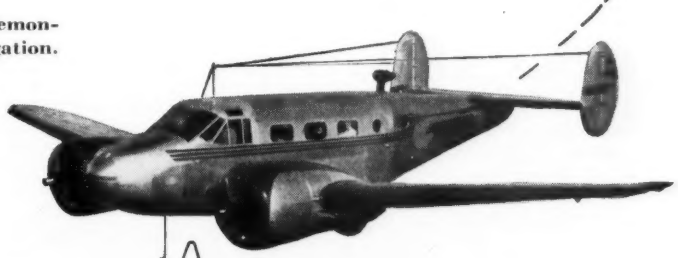

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crews and equipment into inaccessible places.

Laboratory Flight Testing

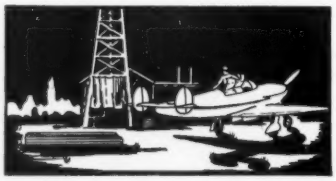
Ground laboratory research and testing of aviation fuels and lubricants is extremely important, and has been to some degree responsible for their present state of development. By far the greatest strides, however, have been made through the use of planes as flying laboratories to follow up ground tests, since many flight conditions and combinations of conditions are difficult or impossible to duplicate on the ground.

Practically all instruments used in the flying-laboratory planes are indicating and must be read by observer engineers who make the flight records. A normal test crew requires five engineers to observe the operation of the engines and to keep running records.

In instrumenting a plane for research in fuel performance, one of the most important units is a torque measuring device to determine the power output of the engine. Very accurate fuel flow meters and very sensitive knock indicators are necessary. Air volume must also be measured, and the carburetor is normally calibrated to permit accurate determinations. In addition to all these instruments, as many as 60 or more thermocouple locations are used to record operating temperatures at various points in the engine.

Temperature is the basic factor to which all phenomena are correlated since it appears to have a closer correlation with fuel properties and operating efficiency than any other variable. Most flight testing is done at constant air pressure levels, although of course when studying the effect of varying altitude, other factors are held as nearly constant as possible, while altitude and thus air pressure are changed.

Correlations are made between flight performance and the consumption and properties of the fuel. By



varying the components and properties of fuels, and comparing engine performance, cause and effect relationships are determined. Working from these data the fuel maker improves his product to give better performance. Improvements in engine design and adjustment are also determined in this manner.

Testing of aviation lubricants requires considerably longer periods of time and is carried on in a somewhat different manner. The important variables are corrosion effects, wear, friction reduction, lubricant stability and rate of consumption. This work involves correlation of observed consumption rates and oil condition after use with wear on bearings, pistons and cylinders. These results can be determined on the ground after flight, by using flight records.

Marketing

The use of pilot-salesmen by the aviation sales departments of oil companies is now a common practice. As expressed by one marketing executive: "It is becoming just as incongruous for a salesman of aviation gasoline and lubes to travel in anything but a plane as it would be for a salesman of motor gasoline and lubes to go about in a horse-drawn buggy."

In aviation sales work, it is necessary to contact field offices, airline representatives, airport managers, plane manufacturers and their distributors, engine manufacturers, local plane-repair and service outlets, flying schools, and other aviation facilities, all of which are generally widely dispersed about the country.

The oil-company sales manager usually divides the country into districts to each of which at least one salesman is assigned with his own personal ship, usually a light plane,

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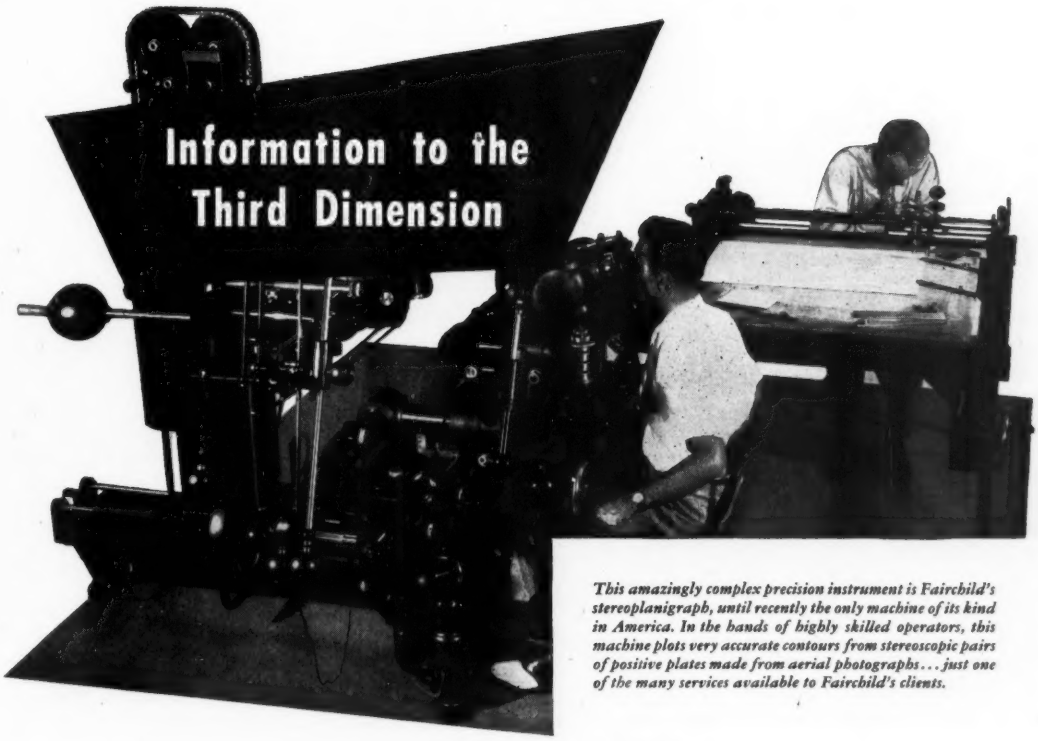

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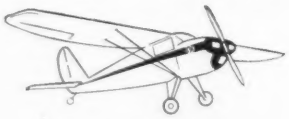

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which he flies himself. When this pilot-salesman starts out to call on a client, he merely tosses his briefcase into the plane, hops in behind the controls and is at his destination, which is usually an airport, in a short time.

Another advantage of the pilot-salesman is that most customers are old-line pilots themselves and will listen much more readily to another pilot who can talk their language than they will to a nonpilot salesman.

Foreign Operation

In the majority of both developed and undeveloped foreign areas, roads in the regions the oil man wants to study are often no more than trails and transportation constitutes a major problem in finding and producing oil. It is in such places that aviation has proved invaluable to the industry.

Exploration in jungle or uninhabited country is extremely difficult since each field party means organizing and outfitting a small-scale expedition into more or less unknown country. If ground survey methods are desirable, as they generally are, efficient planning and organizing of the geological exploration work can be made possible by use of topographic maps. Usually complete coverage of the area by aerial photography is the only method of obtaining information from which such maps can be made. In addition, by careful stereoscopic studies of the aerial photographs it is possible to outline the following areas:

1. Areas of swamps and lowland without outcrops.
2. Flat areas more or less unfolded or covered by terraces.
3. Areas gently to moderately folded. Most of the anticlinal structures can be outlined in a general way.
4. Areas of steep, highly folded structures.

With this information available, much time and effort can be saved by elimination of the unfavorable areas and by pre-determination of the geophysical methods to be undertaken.

Another alternative in exploring such areas is made possible by recent developments of the airborne magnetometer and radar navigation.

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IT DOESN'T TAKE LONG TO GET TO THE FIELD BY AIR

(Aviation Section begins on page 78)

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The ultimate in efficient pipe-line patrol is now available to pipe-line operators. Southwestern Flight pioneers the combination of aircraft and radio for immediate detection of line breaks—for instantaneous warning to repair crews. A powerful central ground station maintains constant communication with radio equipped patrol planes, saving hours in dispatching crews to the scene of the break.
Southwestern Flight is prepared to provide this superior service on your line at reasonable cost. A letter will bring complete information. Write or wire today—and give your pipe-line the protection offered by Southwestern Flight's new radio-equipped pipe-line patrol service.
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SOUTHWESTERN FLIGHT
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THE REALLY COMPLETE LIGHT PLANE

- Continental 85 HP Motor with Generator and Starter
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- Spin and Stall Resistant, yet Retains Maneuverability
- Landing Lights, Dome Light, Ample Space for Luggage
- Unusually quiet cabin, due to Mufflers and Soundproofing
- 1-Piece Plexiglass Windshield for Better Visibility
- Illuminated Instrument Panel with Space for Extra Instruments
- Only 350 Feet Required for Take-off at Sea-level
- Luxurious wool upholstery

Yes, the Funk is one of the most *complete* and *safe* light planes in the sky with a cruising speed of 100 MPH and a cruising range from 350 to 400 miles. Its initial rate of climb is as high as 1000 feet per minute with ordinary load. Safe, low landing speed of 37 MPH. It's a really complete plane . . . one you'll have to see and fly to fully appreciate.

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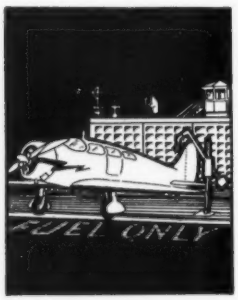
The airborne magnetometer will make possible rapid, accurate and inexpensive magnetic anomaly surveys of any type of country by merely flying the instrument over the area. If the airborne magnetometer is used in conjunction with radar navigation equipment, an extremely accurate location of the area surveyed is possible.

Drilling in foreign areas is extremely difficult since transportation of equipment often must be done by combinations of river barge, over very poor roads by truck, by animal-drawn carts, and even by mule back. Widening a road only 1 ft. frequently requires the moving of thousands of tons of dirt and rock. The best of these roads, even after they have been widened, may be impassable a good part of the time due to weather conditions.

In some regions where surface transportation is practically nil, complete drilling rigs have to be moved slowly and laboriously into location at costs sometimes as high as $60,000, and the time required may be several months. With the type of freight-transport planes now in production, this material could be flown to the location in a few days' time, at a cost estimated at about half that of surface transportation.

After drilling has started, casing, repair parts, fishing tools, and other necessary supplies can be flown to the location at a fraction of the cost of surface transportation. Some of the smaller supplies can even be dropped by parachute. If the well is successfully completed all production equipment can be flown in, and the crews building pipe lines to the well can be supplied with pipe and other necessary equipment by plane.



In foreign countries many miscellaneous uses of aviation are everyday necessities. For example, all the planes of several companies in Central and South America are equipped for vertical photography, which is extensively used in the preparation of mosaic maps. They are also fitted with stretcher racks so that they can be used for emergency ambulance service. A busy taxi service is maintained, delivering personal mail, groceries, and living necessities to widely scattered and inaccessible camps.

Class of the Airfields

By making possible the building of thousands of airports and airfields, the National Airport Act opens the door to sound and tremendous expansion of civil aviation.

Butler engineers, pioneers in the field, are ready. Although limited by current material shortages, Butler factories are geared up to supply unlimited numbers of ultra modern steel hangars by the time new, modern airports can be completed.

Prime example is the Butler Radial Hangar, shown here in the single and in the multiple hangar units.

Up, Over and Under Radial Door

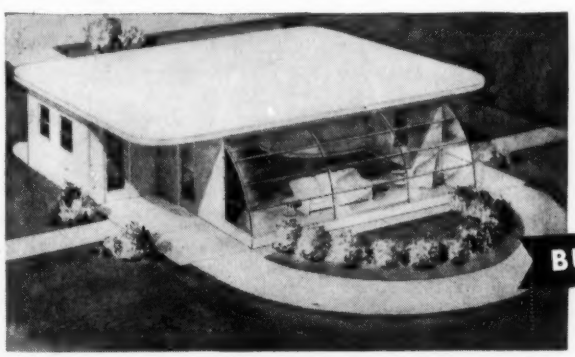
Manually or motor operated, it freely raises up, tilts over and comes to rest under the radial roof out of the path of wind and plane.

Roomy Shop or Club Quarters

For the private owner, the single unit provides, in one front corner, club or office quarters; in the other, well daylighted space for shop and parts storage. Similar space is afforded in each end hangar of the multiple unit arrangement.

Turn-Key Privacy For Plane, Pilot and Parts

Steel frame and specially corrugated galvanized steel radial shell combine to give maximum structural strength and protection against fire, weather and tampering. As single unit or as partitioned multiple unit hangars, the Butler Radial affords turn-key privacy to the private plane owner.



BUTLER BUILT
Reg. U.S. Pat. Off.

Administration Building Chosen For First Model Airpark

In early June, Eldon, Missouri dedicates a modern airpark. It is widely proclaimed as the model for thousands of landlocked communities which want to reap the benefits of an airlink with the air lanes. Chosen for the Administration Building of the model Eldon Airpark was the Butler key-locked, panel-framed steel building at the left.

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XUM

Petrochemistry

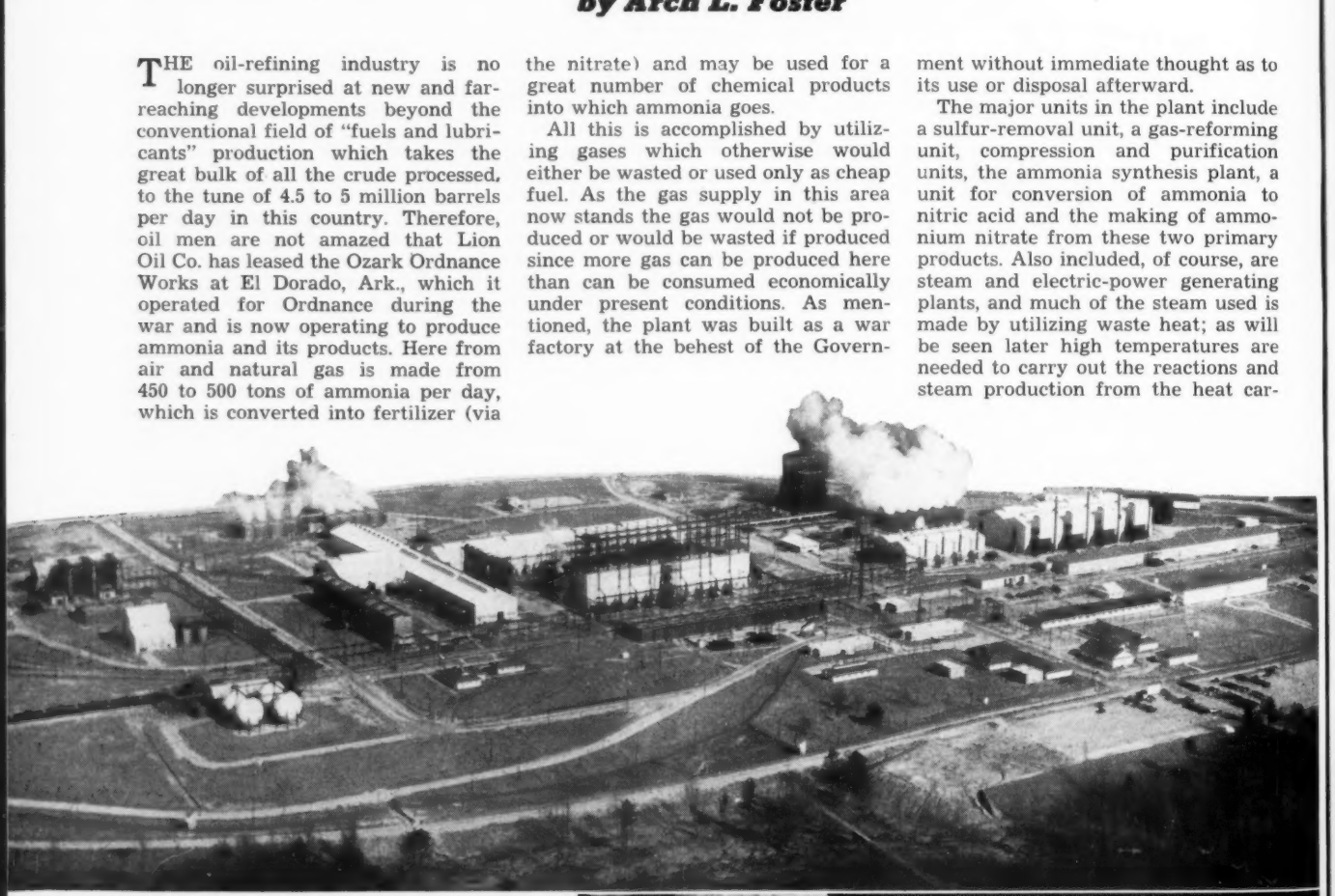
Directs Natural-Gas Conversion at Lion Oil Co. Plant

by Arch L. Foster

THE oil-refining industry is no longer surprised at new and far-reaching developments beyond the conventional field of "fuels and lubricants" production which takes the great bulk of all the crude processed, to the tune of 4.5 to 5 million barrels per day in this country. Therefore, oil men are not amazed that Lion Oil Co. has leased the Ozark Ordnance Works at El Dorado, Ark., which it operated for Ordnance during the war and is now operating to produce ammonia and its products. Here from air and natural gas is made from 450 to 500 tons of ammonia per day, which is converted into fertilizer (via the nitrate) and may be used for a great number of chemical products into which ammonia goes.

All this is accomplished by utilizing gases which otherwise would either be wasted or used only as cheap fuel. As the gas supply in this area now stands the gas would not be produced or would be wasted if produced since more gas can be produced here than can be consumed economically under present conditions. As mentioned, the plant was built as a war factory at the behest of the Government without immediate thought as to its use or disposal afterward.

The major units in the plant include a sulfur-removal unit, a gas-reforming unit, compression and purification units, the ammonia synthesis plant, a unit for conversion of ammonia to nitric acid and the making of ammonium nitrate from these two primary products. Also included, of course, are steam and electric-power generating plants, and much of the steam used is made by utilizing waste heat; as will be seen later high temperatures are needed to carry out the reactions and steam production from the heat car-



Lion Oil Co.'s huge plant at El Dorado, Ark., starts with natural gas as the basic raw material . . .

. . . Ammonium nitrate pellets, for fertilizer, will be a principal product among the literally hundreds of items that can be made.

ried in the reaction gases adds materially to the economy of the processes.

The Plant and Process

Raw natural gas is introduced into the plant first through the sulfur-removal unit. Here a series of eight vessels each 5 ft. in diameter by 14 ft. high are packed with ¼-in. pellets of zinc oxide (ZnO), the total oxide present being 241,000 lb. The gas is low in sulfur, only 1 to 2 p.p.m., but this must be removed quantitatively to prevent contamination and poisoning of the catalysts used in later steps. The zinc oxide reacts to form the sulfide which may be regenerated by heating to drive off the sulfur; the amount is so small that no regenerating equipment is provided and it is estimated that several years' operation may be carried out before regeneration is necessary. This desulfurizing step is carried out at 400° C. (752° F.) and about 70 psig. The catalyst is supported on eight trays in each tower with a void space between each bed and the adjacent beds.

The next step mixes low-pressure steam with the purified gas, with the steam also superheated to 400° C. This mixture, containing three to four mols of steam per mol of gas, enters the primary reformer furnace at very nominal pressure which in fact is essentially the pressure drop through the reform tubes plus the back pressure on the system of about 5 in. of mercury or 2 to 3 psig. A series of headers in the furnace connects a bank of tubes filled with a catalyst of small cylinders of diatomaceous or other earth material on which is supported nickel metal, the active catalyst, the cylinders being about ¾ in. long. Three sections each contain 22 tubes, and four parallel furnaces contain a total of 97,000 lb. of this catalyst.

With water present as steam the reaction in this furnace, carried out at 725° C. (1,337° F.), is essentially as follows in the equations,

$$CH_4 + H_2O = CO + 3H_2$$

$$CO + H_2O = CO_2 + H_2.$$ Or, combining the equations the end result is,

$$CH_4 + 2H_2O = CO_2 + 4H_2.$$

In typical operation about 22,000 cu. ft. of gas is processed for each ton of ammonia, NH_3, synthesized. About 93 per cent of the methane is converted which at 98 per cent equilibrium gives a process efficiency slightly less than 95 per cent in this step. The volume of gas has been increased to 97,000 cu. ft. in passing through and reacting in the primary reactor or reformer as it is called. The inlet gas is 91.5 per cent methane, 2 per cent carbon dioxide, and 6.5 per cent ethane and heavier. After the primary reaction, the composition is 1.5 per cent methane, 11.0 per cent CO, 11.9 per cent CO_2, and 70-75 per cent hydrogen.

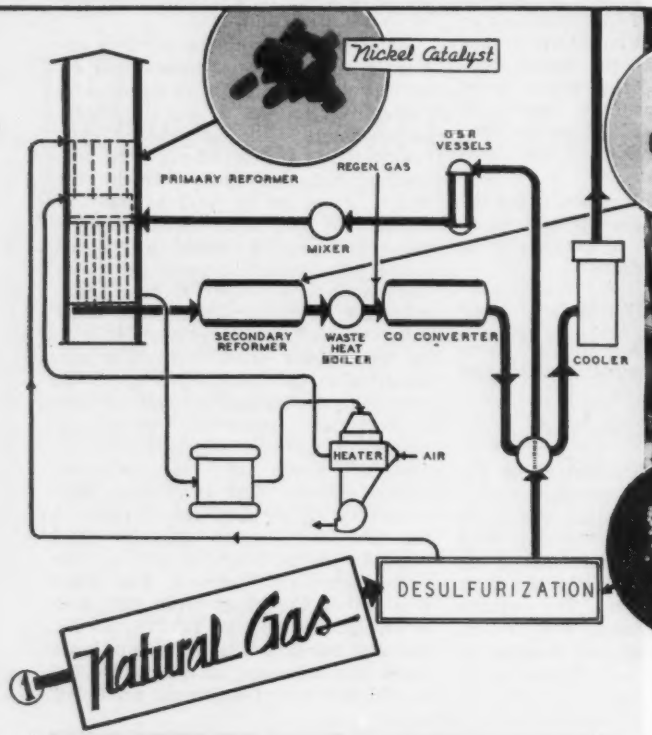
After passing from the primary reformer, the gases are mixed with air for the double purpose of completing the conversion and to add the necessary amount of atmospheric nitrogen required for the synthesis. The secondary reformer into which the mixed gases go is held at 900° C. (1,652° F.) and is a horizontal cylinder fitted with metal grates on which the nickel catalyst is held; this catalyst is supported on a more refractory carrier which will withstand the higher temperature. It is to be understood that four units are installed in the plant, each of which operates independently and as described here. These four secondary reformers contain 107,000 lb. of the catalyst. Some of the hydrogen formed in the first conversion step is burned to remove the oxygen of the air, which water (steam) later reacts with at least a part of the carbon monoxide present. The composition of the gases from this step is essentially 9.6 CO, 11 CO_2, 57 H_2, and 21.4 nitrogen. The volume of total gases has increased to nearly 114,000 cu. ft. per ton of ammonia produced

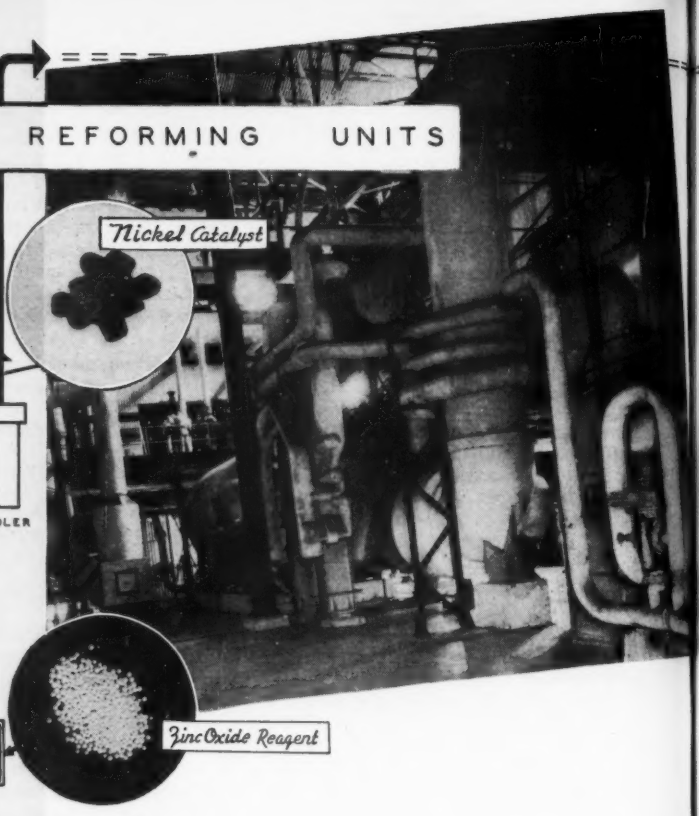
On the opposite page is shown Lion Oil Co.'s chemical plant at El Dorado, Ark. Also shown is a sample of one of the plant's main products, ammonium nitrate. Below are the 78-ft. water-scrubber towers, where one step in purifying the reaction gases is carried out

A PARTIAL LIST OF APPLICATIONS OF AMMONIA FROM NATURAL GAS

- Refrigeration
- Neutralizing Agent—Petroleum and other industries
- Detergent
- Bleaching
- Medicinals
- Catalyst in Nylon manufacture
- Production of metal powders
- Synthetic rubber
- Calico printing
- Ammonium Nitrate—Fertilizer, explosives
- Ammonium Sulfate—Fertilizer, galvanizing
- Urea Solutions—Fertilizer
- Nitric Acid—Organic synthesis
- Nitrocellulose—Explosives, textiles
- Picric Acid—Explosive, Textile mordant
- Ammonium Picrate—Explosive
- TNT—Explosive
- Amatol—Explosive
- Nitroglycerin—Explosive
- RDX—Explosive
- Dynamite—Explosive
- Nitrobenzene—Lube-oil refining, odorant, soap
- Nitroparaffins—Solvents, organic synthesis
- Ammonium Carbonate—Manufacturing rubber articles
- Urea plastics
- Fire extinguisher
- Aspirin
- Acetate rayon—textiles, tires
- Resins and plastics—Plexiglass, Lucite, Films, lacquers
- Isoprene—Synthetic rubber
- Synthetic gasoline, diesel fuel, lubricating oil

DESULFURIZATION AND REFORMING UNITS

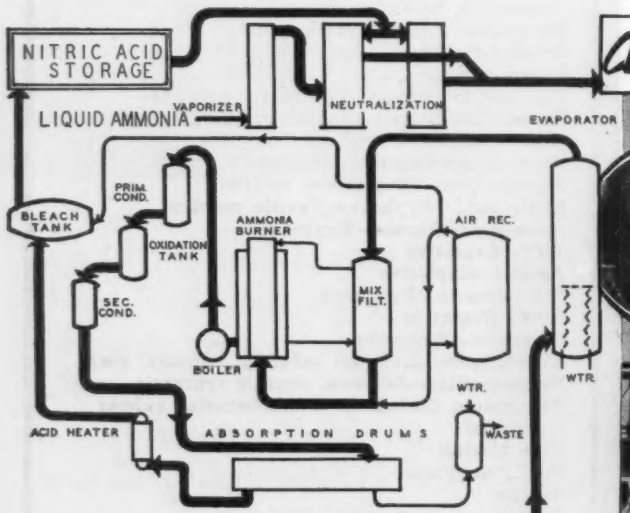




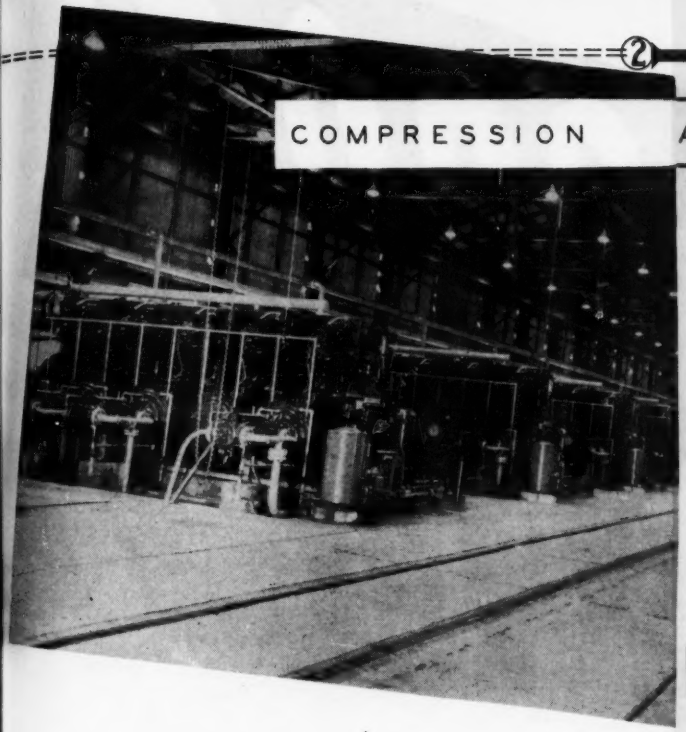
1 *The first group of steps of the ammonia synthesis includes desulfurization; primary reforming in which superheated steam is added to the charge gas in the "mixer" unit, and is reacted in the primary reformer; air comes in to introduce nitrogen; this reaction is carried to completion in the secondary reformer; CO is converted to CO_2 for which the iron oxide catalyst is shown in the second drawing*

Nitric acid and ammonium nitrate are made in the final operation; ammonia is vaporized, mixed with air, and burned to form nitrogen oxides; these oxides are mixed with more air and oxidized further and finally are mixed with water to form the acid which is bleached and stored. The nitrate is formed by vaporizing more ammonia and reacting acid and ammonia to form ammonium nitrate, NH_4NO_3. This is only one of hundreds of products which may derive from ammonia so synthesized from natural gas. Platinum-rhodium gauze is the catalyst in forming the acid; the workman in the photo just left of Chart 3 is watching the gauze catalyst in the converter through a look-glass.

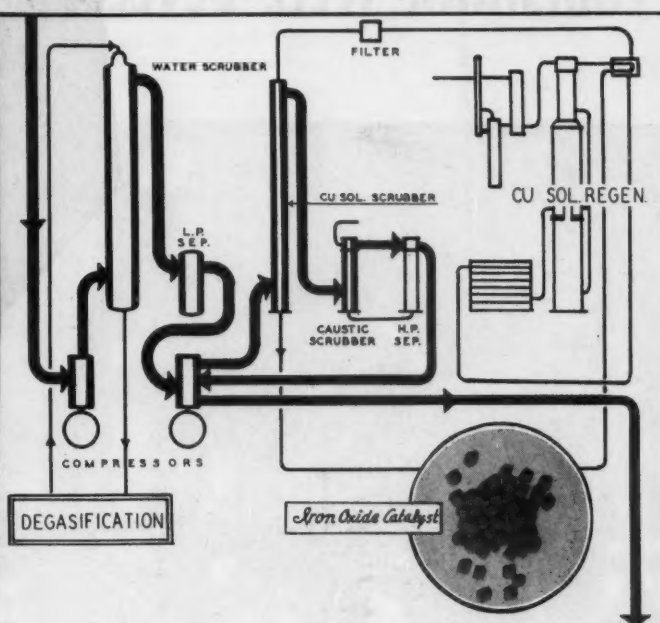
4



NITRIC ACID UNIT



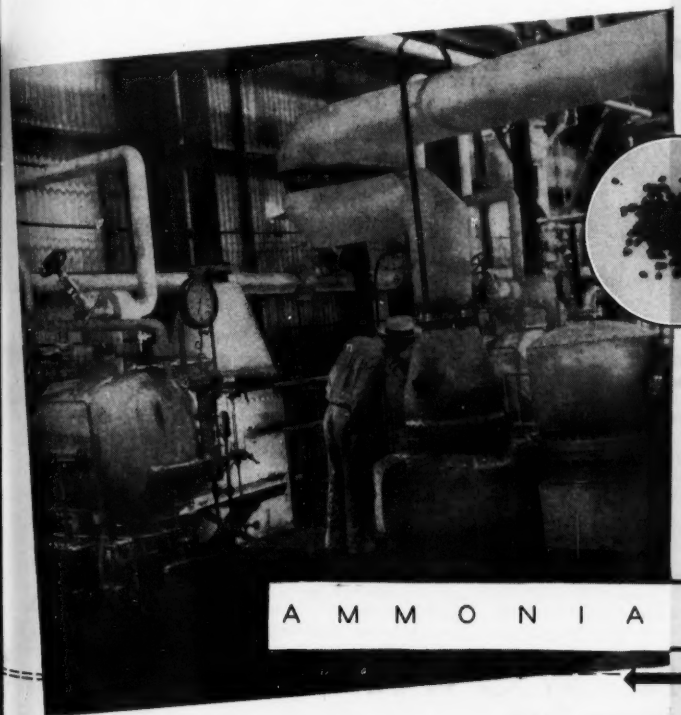
COMPRESSION AND PURIFICATION UNIT

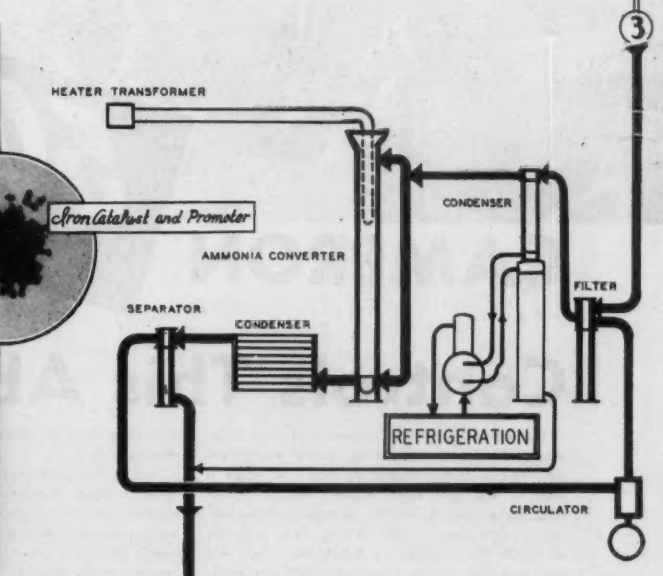


2 *In this second set of operations the raw reformed gases are scrubbed with water and with copper ammonium formate solution to remove carbon oxides. Gas undergoes six stages of compression, with the two main purification steps interspersed between the third and fourth stages, and between the fifth and sixth stages. Most of the carbon dioxide is removed in the water scrubber; residual carbon monoxide is removed in the Cu solution scrubber. Cu solution is regenerated in the unit at right. The iron oxide catalyst shown on the chart is used in the CO converter near the end of Chart 1. After the sixth compression stage, the purified gases pass to the converter.*

The purified gases, containing mostly hydrogen and atmospheric nitrogen, pass through a filter and into a cooling unit, where some product may be condensed; thence to the main converter where it is reacted to form ammonia, NH_3. This ammonia is condensed and passes to a separator, thence to storage. Unreacted gases are returned from the separator to the circulator, to mingle with the fresh gases entering the filter. A promoted iron catalyst is used in the converter. A purge line valve (not shown) is installed in the split line entering both ends of the converter, to dispose of inert gases.

3

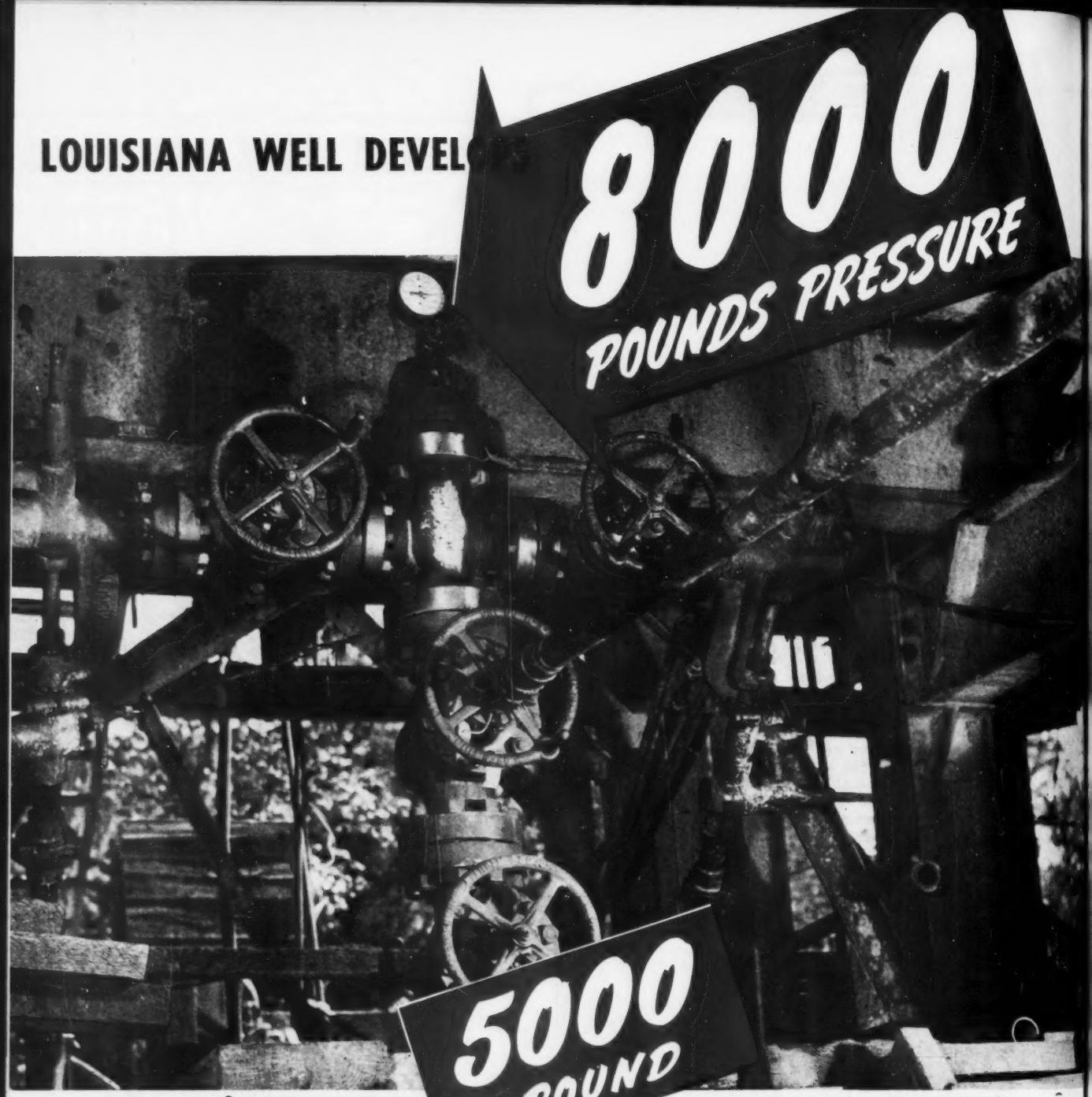




AMMONIA SYNTHESIS

AMMONIA

LOUISIANA WELL DEVEL



CAMERON XMAS TREE

Controls This Abnormal Pressure

The extra margin of safety built into Cameron drilling and completion control equipment was again demonstrated on May 14 when a well in the Egan field, Acadia Parish, Louisiana, developed 8,000 lbs. pressure while testing a new deep sand. Tubing flow pressure of 7,200 lbs. climbed to 8,000 lbs. when the well was shut in. The Cameron 5,000 lbs. working pressure Christmas tree, with a pressure over-load of 60% kept things under control during the critical hours after the master gate valve was closed and until the well "loaded up" with fluid to cause the abnormal pressure to diminish.

While, for several years, a majority of the world's deep, high pressure wells have been drilled and/or completed with the aid of Cameron pressure control units, Cameron completion control equipment has been spotlighted in recent weeks because of its use on a number of record-breaking wells: Irby No. 1 in the Berclair field of South Texas with 6885 lbs. flow pressure; Smith-State Unit No. 1, Well No. 2 in the Weeks Island field of South Louisiana —completed at 13,778' as the world's deepest producer; Holland No. 1 in the Blue Lake field of South Texas with an all-time high initial flow pressure of 8200 lbs.; and the above well, No. 3 Elizabeth Regan, with 8000 lbs. shut-in pressure.

In completing scores of high pressure wells, the Cameron field organization has acquired a broad understanding of the numerous problems encountered and has perfected methods and equipment to minimize completion hazards.

CAMERON IRON WORKS, INC.

711 Milby St., Houston, Texas

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California: H. G. (Jeff) Musolf, Los Angeles (Kimball 1281), Long Beach (6-68387).

XUM

finally. In this secondary reformer step only about 12 per cent of the CH_4 present is changed to hydrogen and carbon oxides.

It is necessary to convert as much of the CO as possible to CO_2, to simplify its final elimination from the reaction gases and to produce as much hydrogen as possible. The hot gases pass through a waste-heat boiler to generate 275 lb. steam, and are mixed then with an equal volume of steam, passing into the carbon monoxide converter at 540° C (1,004° F.). This vessel is 10 ft. in diameter by 31 ft. long, and is packed with a pelleted iron oxide catalyst, Fe_3O_4, as small cylinders or rods about ¼ to ⅜ in. in diameter by ½ in. in length. The four CO converters contain some 257,000 lb. of this catalyst. The steam reacts with the CO to form CO_2 and releases hydrogen to bring the gas composition to 1 per cent methane, 4 CO, 15.3 CO_2, 59-60 H_2, and 20-21 N_2, and the volume of gases to nearly 120,000 cu. ft. In this effluent gas for the first time the proportions of hydrogen and of nitrogen are practically the theoretical for the ammonia reaction, that is, three mols of hydrogen and one mol of nitrogen.

Except for the removal of carbon oxides the gases are ready for the synthesis. They pass in parallel flow through a steam interchanger and a gas interchanger, entering at 540° C. (1,004° F.). The steam interchanger is 54 in. in diameter by 40 ft. high, of tubular construction, as is the gas interchanger which is 32 in. in diameter by 39 ft. high. The partially cooled gases then pass through a cooling tower packed with ceramic Raschig rings, countercurrent to downflowing water, and emerges at 30° C. (86° F.) or approximately atmospheric temperature. The gas is conveyed to the compression unit through a 54-in. diameter line on which a holder rides. The holder is not designed to store gases until required for synthesis; in fact the plant can operate only about 8-10 minutes on the contents of the holder alone. It serves as a sort of surge tank, to smooth out the fluctuations of the system, discharging gas when the "make" volume drops a little, taking in gas when more is made than is taken by the remainder of the system.

Compression and Purification

From the holder the first of the low-compression stages picks up the gases. The compressor battery includes 24 Cooper-Bessemer 1,000-hp. gas-engine-driven units, each with three stages. Of these, 12 are low pressure and 12 high pressure. The gas is boosted to 225 psig. in the three low stages, using intercoolers to keep down the temperature, and this gas then enters the water scrubber towers at about 30° C. (86° F.). The greater portion of the carbon dioxide is removed by water washing, reducing CO_2 to about 1 per cent. From these 78-ft. towers, the water at 225 psig. is passed through four Morris hydraulic turbines each of 886 hp. which drive Westinghouse 750-kw. a.c. generators to develop a portion of the electric power used in the plant. Afterward this water is released in atmospheric towers where any dissolved gas is vented to the air.

The water-washed and almost carbon-dioxide-free gas then enters the fourth and fifth stages of the high-pressure compressors, after dropping out any entrained water, and is raised to 1,800 psig. It is then admitted to the bottom of the copper solution scrubber. The copper solution, in the form of copper ammonium formate, removes essentially all the monoxide and dioxide. The compositions of the fresh solution, and of the solution normally in use are shown in Table 1.

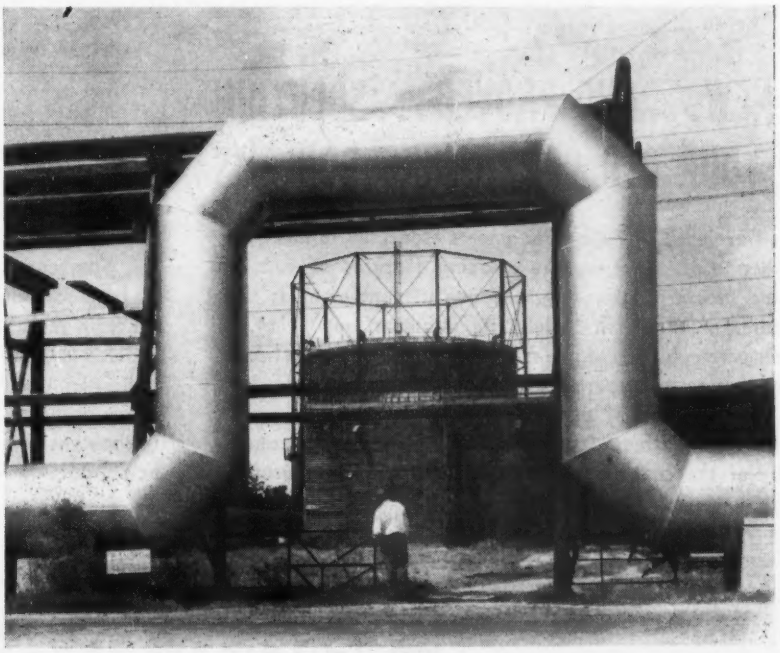
TABLE 1—COMPOSITION OF COPPER SOLUTIONS

	Amounts, grams per 100 cc.	
Component—	Fresh	Used solution
Copper, Cu	16.5	16.5
Ammonium, NH_4	17.8	17.8
Formic acid, HCOOH	2.6	2.6
Carbon dioxide, CO_2	...	12.0

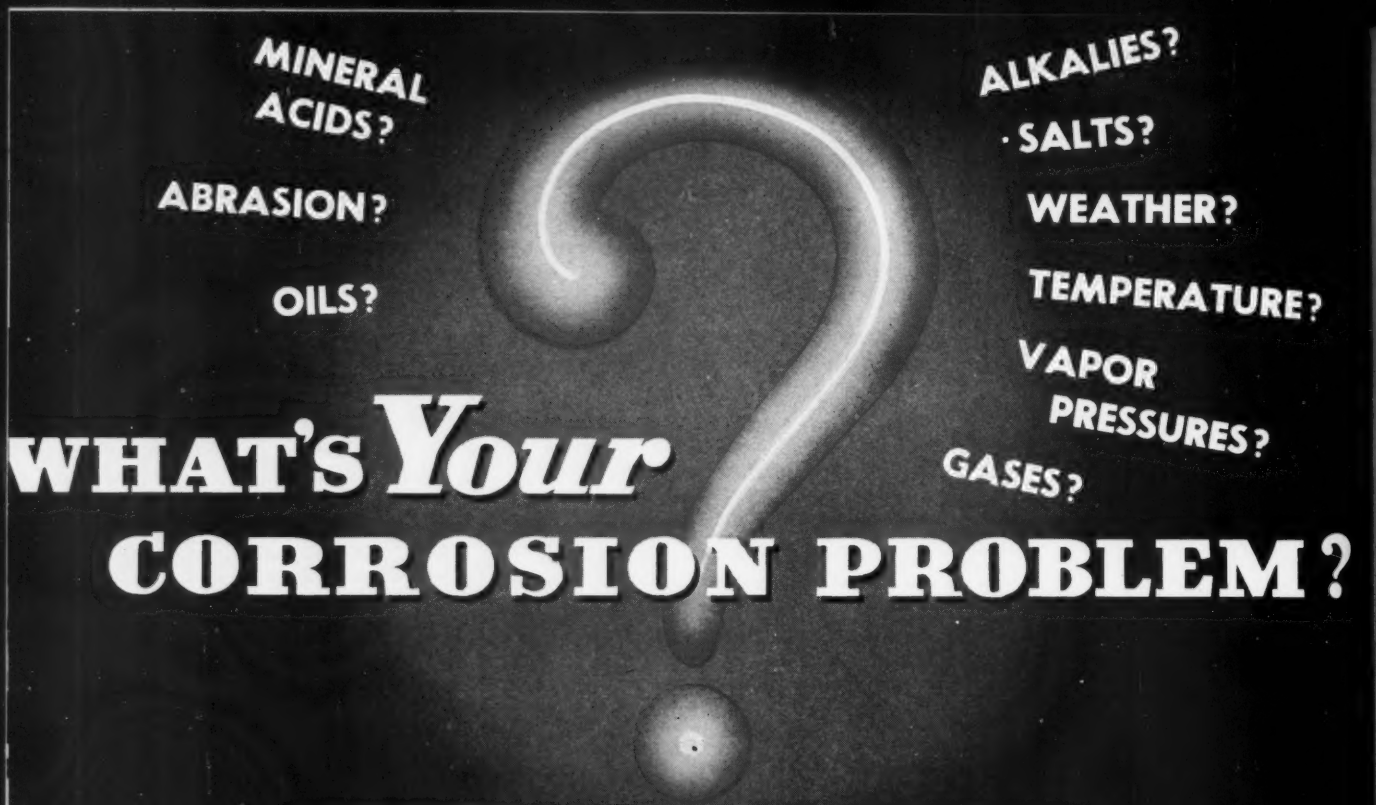
It is understood that the acetate can be used, also, but it has not been tried in this plant.

The copper solution is chilled with liquid ammonia to 0°-5° C. (32°-41° F.) and passes down the Raschig-ring packed tower countercurrent to the gases, now reduced to approximately 98,000 cu. ft., at essentially atmospheric temperature. Practically 20,000 cu. ft. of gas is lost in the water-scrubbing operation and the copper scrubbing loses 7,000 cu. ft. more. After the water wash, the hydrogen content is about 69 per cent, nitrogen nearly 24 per cent, CO_2 1.3, CO 4.7, and slight amounts of unconverted methane. After the copper solution wash, the gases pass to a caustic washing with 5 per cent NaOH, countercurrent in a bubble-tray tower. These operations remove essentially every trace of carbon dioxide, leaving a purified gas ready for the synthesis when again compressed, containing 73-74 per cent hydrogen and 25 per cent nitrogen or nearly theoretical proportions.

The copper solution is regenerated by passing through the upper section of the regenerator tower where it goes countercurrent to the gases released from the same solution in the lower section. Caught on a total draw-off tray at the bottom of this upper section the spent solution, having picked up preferentially the ammonia in the released gases but not the carbon oxides, is sent to the bottom section of the tower. Here it is heated by steam coils, the level being held above the banks of tubes in the middle section, through which tubes the solution passes, steam being admitted to surround the tubes and release the carbon oxides held in loose chemical combination by the copper ammonium formate. Air is admitted here to oxidize some of the cuprous to cupric



This 54-in. pipe line conveys reaction gases from the forming unit to the compressors, and gives some idea of the volumes handled in this step of the process



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ions, to maintain about 2 to 3 grams per 100 cc. of cupric ions in the regenerated solution. The solution passes continuously over a weir arrangement to exit from the regenerator, is cooled first by water, then by liquid ammonia and returned to the purification unit to recontact gases. The reaction gases are now purified and ready for the last compression, to 5,000 psig., are cooled and enter the synthesis unit, 91,000 cu. ft.

Ammonia Synthesis

The cleaned and purified gases now pass to the synthesis group. Fresh gas is mixed in a bag-type filter with recycle gas, or as it is called recirculation gas, it being the gases from the reaction chamber which have not been converted to ammonia, or small amounts of inert gases which take no part in the reaction. As the operation continues these inerts must be vented, as shown below. From the filter the combined streams pass to the cold exchanger, a shell fitted with cooler coils in which the gas is cooled and then to the liquid-ammonia-cooled condenser where the gases are reduced to about —10° C. (14° F.). In this cooler any ammonia which has formed is liquefied and drops out in the lower section of the cold exchanger, passing to the "make tank" or "letdown tank" as final product.

From the lower part of the cold exchanger the cooled gases pass in heat exchange with the gases to the ammonia-cooled condenser and then to the reactor, or ammonia converter. This converter is of unique construction. The entering gas line divides, with most of the gas going into the upper part of the reactor converter, and such quantity needed for temperature control is routed into the lower part. That portion entering at the top passes into an annular space and thence downward through this space completely surrounding the reaction zone with the cold gases until they reach the lower end where all enter a baffled space through which heater pipes extend, pass upward through this space and reach the catalyst section. To purge from the recycle gases the inerts mentioned above, a purge valve and line are inserted in this inlet branch between the point where the gas stream is split and where the gases enter the converter. These gases typically show H_2 59, N_2 20, CH_4 and inerts 15, NH_3 2.4.

To aid in temperature control in the converter several arrangements are made. The other branch of the incoming gas line leads cold gas directly into and through the preheater section to mingle with the gas coming through from the heater section itself. The gases passing to the catalyst section, after being preheated by the gases exiting from the converter, come into direct contact with the promoted iron catalyst. The temperature at the top of the catalyst chamber is about 425° C. (797° F.) when the hot spot, usually the middle portion, is maintained at about 525° C. (977° F.), while at the exit the product and unreacted gases are at 150° C. (302° F.). For starting the unit an electric heater coil is used, but once in operation the reaction is exothermic and maintains its own reaction temperature.

The reaction mixture is cooled in a water cooler, sent through a separator and the ammonia so liquefied is sent to "letdown" tanks and then to four liquid ammonia Hortonspheres, maintained at about 80 psig. Unreacted gases are sent to the recycle compressors, Worthington gas-engine driven, 13 by 6¼ by 21-in., which combine this stream with the fresh reaction gases as explained above.

The amount of product made is determined exactly by weight. An indicating dial scale connected to the letdown tanks, shows at any instant the total weight; by finding the difference between the gross and the net weights the amount of ammonia in pounds or tons may be had immediately.

Very careful check is kept on the composition and quality of the gases and the product. For example, the amount of CO_2 is determined or its presence or absence are determined by determining the change in conductivity of some standard solution, as barium hydroxide. If CO_2 is coming through it forms the carbonate with the barium, which changes the solubility and the conductivity of the solution.

Included in the lease to the company are 90 tank cars of special construction. The product is weighed directly into the tank cars, by weighing them before and after filling. After reforming the gas the plant shows an efficiency of almost 90 per cent, an over-all efficiency of about 84 per cent.

Making Nitric Acid and Ammonium Nitrate

Nitric acid is made from the ammonia by oxidation, first by burning with air in the presence of a catalyst to form oxide of nitrogen, and finally combining with water. The liquid ammonia is vaporized with hot nitric acid from the absorption towers and superheated with steam, and is then mixed with the proper amount of air to satisfy the burning equation and burned in the presence of platinum-rhodium gauze at 900° C. (1,652° F.), to form the oxide as follows:

$$4NH_3 + 5O_2 = 4NO + 6H_2O$$

The combustion products pass through a waste-heat boiler and to a primary condenser, then into the oxidation tank where the following reaction takes place:

$$2NO + O_2 = 2NO_2$$

In effect this step is combined with the last step as given in the equation:

$$4NO + 3O_2 + 2H_2O = 4HNO_3 \text{ (Nitric acid)}$$

The manufacture of ammonium nitrate is merely mixing the two products, acid and ammonia, under controlled conditions to carry out the metathetical reaction, really an addition reaction to form NH_4NO_3.

Additional equipment is to be installed, for the purpose of pelletizing or "graining" the nitrate for fertilizer use. Until this unit is built the company for this purpose is using equipment installed by the Government at Texarkana and Minden, La.

The demand for fertilizer—nitrate—promises to exceed the capacity of existing facilities for some time. In addition to shortages within the United States several foreign countries are seeking large quantities of nitrogen fertilizers in the international market. Since Germany is not to be permitted to build ammonia or nitrate plants, because of their great similarity to explosives plants, she will doubtless have to import many of these products. Obviously the company plans to supply the major portion of the product to the domestic market.

Advantage to Industry

As a matter of course the manufacture of ammonia and its use is of advantage to the refining industry for several applications. Ammonia is used to counteract corrosive effects of salt or of hydrochloric or other acids released during distilling operations. It may be used to neutralize acidic impurities in products, and it can be used and is being used more and more to replace caustic soda. Its embrittling effect on steels is much less, it is understood, than that of caustic soda, in fact embrittlement by ammonia is practically nonexistent, a decided advantage in various operations.

The entire plant operation is under the supervision of J. M. Wadsworth, manager of the chemical division, internationally known refining engineer who has built and operated refineries and other chemical plants throughout the world. Wadsworth is aided by A. M. Sprague, general superintendent of the plant, and a large group of experienced engineers, chemists, and technologists who have worked through the entire period to build the plant and make it "work." From a national-defense viewpoint it is interesting to note that by a "turn of the wrist" the operation is changed from making high explosives for destruction to the most constructive one of making fertilizer to grow crops to help feed the world. By various nonfundamental changes a long list of different products may be made, differing radically in chemical composition but producible in the same equipment and, in general, analogous series of reactions.

ELECTRIC GENERATING PLANTS—

A Discussion of Installation Cot

*by J. H. Field**

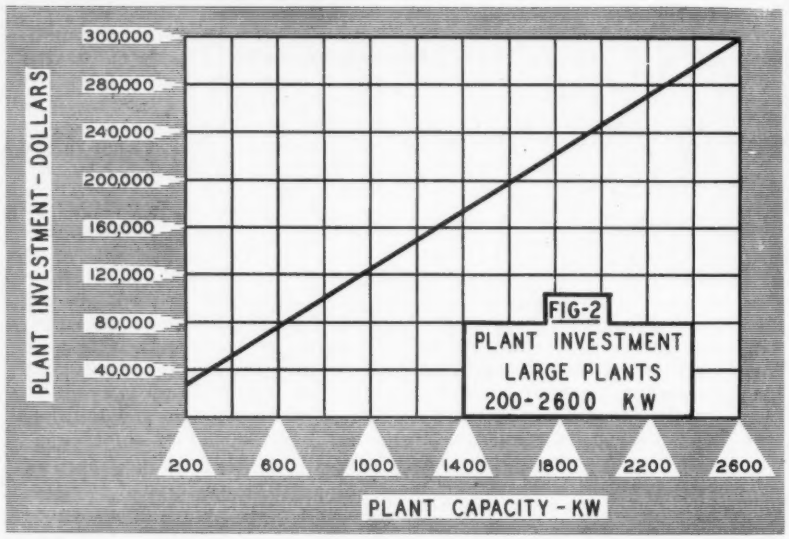
SOME generating plants have slow-speed multiple-cylinder engines for prime movers, others have high-speed multiple-cylinder engines, and still others are powered by single-cylinder engines. Some generating units are mounted on skids, others are installed on permanent concrete foundations. The plant buildings may be of the steel mill type, or fabricated from corrugated sheet steel and wood frame. There are many other factors, too numerous to mention, that affect the plant investment. Consequently, any discussion on installation costs of generating plants must deal in averages.

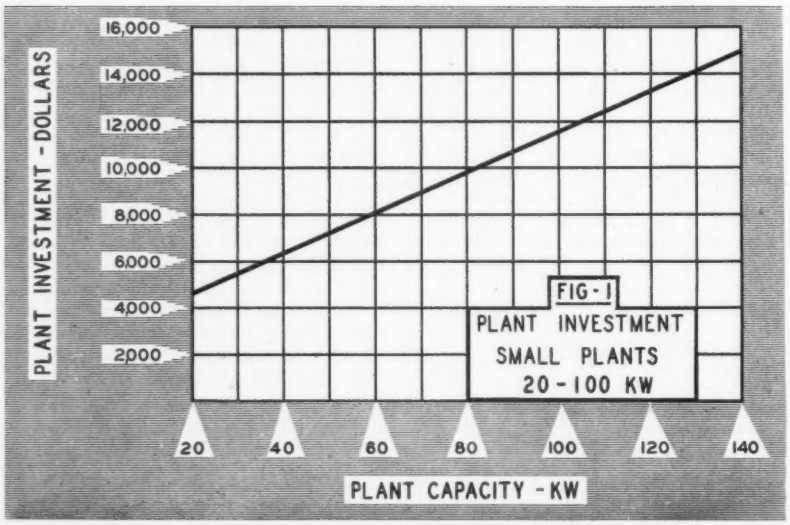
Data concerning the cost of installation of 30 generating plants ranging in capacity from 35 to 2500 kw. were reviewed. Publication of the investment for each plant is not permitted, but graphs have been drawn showing the average cost of installation for various sizes of plants. These are shown in Figs. 1 and 2, covering small plants and large plants, respectively.

For all practical purposes, a straight-line relationship exists between the plant capacity in kilowatts and the plant investment in dollars. It will be noted that the investment amounts to approximately $120 per kilowatt for the large plants as well as for the small plants. This figure may prove of some value for quick calculation during preliminary discussions of generating plant installations.

*Sohio Petroleum Corp.

This is the second part of a paper presented by the author at the spring meeting of the Mid-Continent Section, Production Division, A.P.I., at Oklahoma City, June 6-7. The first part, published June 15, discussed pumping wells with electric power.





tions the poles supporting the secondary sides are 25 and 30 ft. long.

In the preparation of an estimate for the installation of a distribution system it would be a tedious job to determine the exact size of wire to be used, the number of anchors and guys, the number of cross arms and dead ends, and other material comprising the system. For purposes of approximation, a figure of $0.45 per foot has been used as an average cost of installation of three-phase distribution system, which includes right-of-way expense.

Cost of Electrical Well Equipment

Electrical well equipment consists of a motor, motor control unit, and miscellaneous wire and fixtures to connect to the distribution system. The cost of small three-phase splash-proof motors normally employed for

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oil-well pumping in general will range from $70 for a 3-hp. motor to $150 for 7½-hp. motor. The motor-control unit, consisting of a fused disconnect switch, magnetic motor starter with overload trips, time-clock control, and lightning arrestor, all mounted in a steel weatherproof box, will cost in the neighborhood of $80 for each motor sizes 7½ hp. and smaller.

Cost of installation of the electrical well equipment will vary with labor conditions in any area, but it is reasonable to assume an installation charge of $60 per well, for labor and miscellaneous wire and fittings, making a total charge for the installation of electrical well equipment of $200 to $300, depending on the size of the motor.

After an operator has investigated the investment charges for an electrical system, he next is interested in the cost of operation of this equipment. The most important item in the electrical operating expense statement is the charge for electrical energy. Cost of electrical energy generated by lease plants will be discussed first, and later will be compared to the cost of purchased electrical energy.

Because of the many variables affecting operating expense it is not possible to predict with any degree of accuracy what the operating expense of any individual generating plant would likely be, but based on the performance of over 25 oil-field generating stations, the information herein discussed may be of some help to those who have not previously operated generating plants.

It is a well-known fact that the accounting system of one company varies from that of another company. Some operators keep accurate records of all supplies charged to a plant, as a separate item, while other operators include supply charges with repair materials, etc. In some instances, a portion of pumper labor is charged against plant-operating expense, while in other cases the statements show no pumper labor. A few of the plants were depreciated over a period of 10 years, others over a period of 5 to 8 years, and still some showed no depreciation in the operating expense statement.

After a thorough study of the many operating-expense records of generating plants, it was decided to use the breakdown of expense as shown in Table 1, this to be used for all plants regardless of size. All items of expense for each plant were therefore arranged to conform with the breakdown shown.

A uniform system for handling indirect operating expenses for each plant is shown below:

Indirect Charges

1. **Depreciation.**—Annual depreciation was considered to be 10 per cent of the original investment, regardless of the size of the plant.

2. **Interest on investment.**—Interest on investment was taken as 4 per cent per year on the depreciated value, which at the depreciation rate shown would amount to approximately 2.2 per cent per year on the original investment.

3. **Ad valorem tax.**—Some states do not have an ad valorem tax on equipment that is used in the production of oil, while other states have such a tax. It was decided to use a yearly ad valorem tax rate of 1 per cent of initial investment.

4. **Social Security tax.**—The social security tax rate of 1 per cent of the operating labor was applied against the plant-operating expense.

5. **Unemployment compensation.**—The unemployment compensation rate is a variable among companies and a rate of 1 per cent of operating charges was believed to be representative.

Direct Charges

1. **Fuel.**—In some instances, operators showed a charge for fuel (gas) in the operating statement even though gas was being vented on the lease. A fuel charge, it was claimed, was necessary since gas from one lease was used to operate a generating plant serving more than one lease. In consequence, a fuel charge of 8 cents per M.c.f. was established for all plants.

2. **Operating labor.**—Many small generating plants are operated by the pumper on the lease and the amount of pumper labor would likely be the same regardless of whether electricity was purchased or generated, and therefore no pumper labor was charged against operating expense of small plants. Plants having a capacity of 500 kw. and over usually have an operator on duty full time. Plants falling in this category were charged with operating labor.

The generating expense data for various oil companies did not cover the same period; some included a period of 5 years while others included only 12 months. Operating expenses were therefore reduced to average monthly figures.

The size of a plant is an important factor, affecting generating cost.

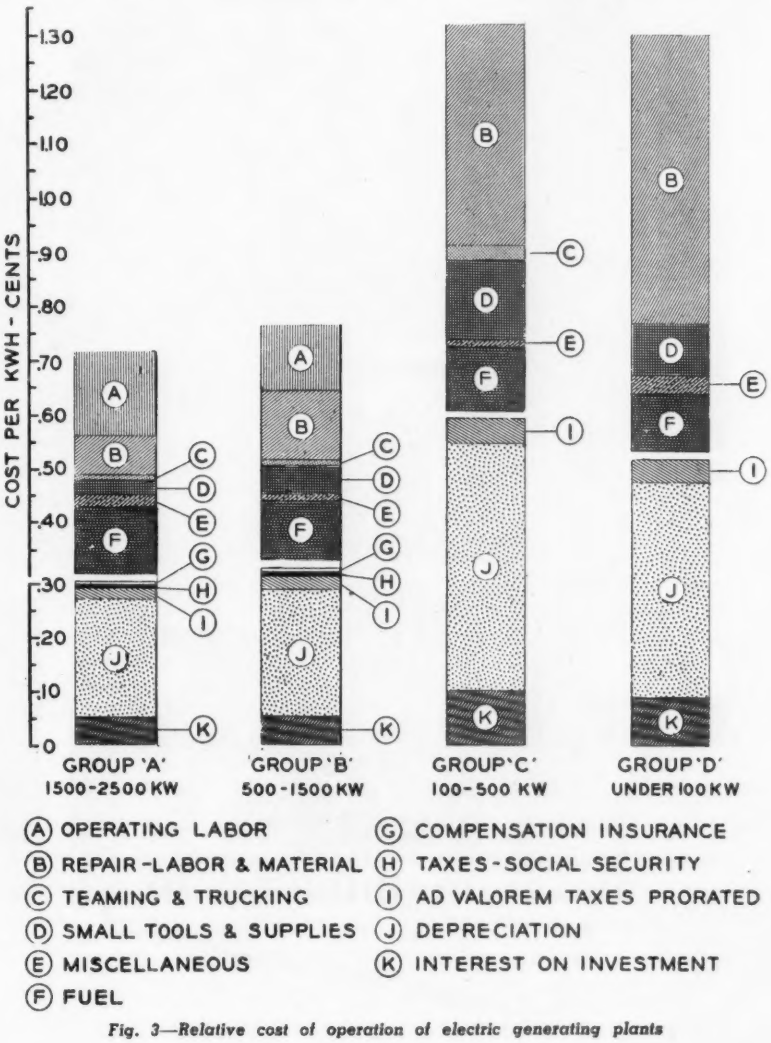
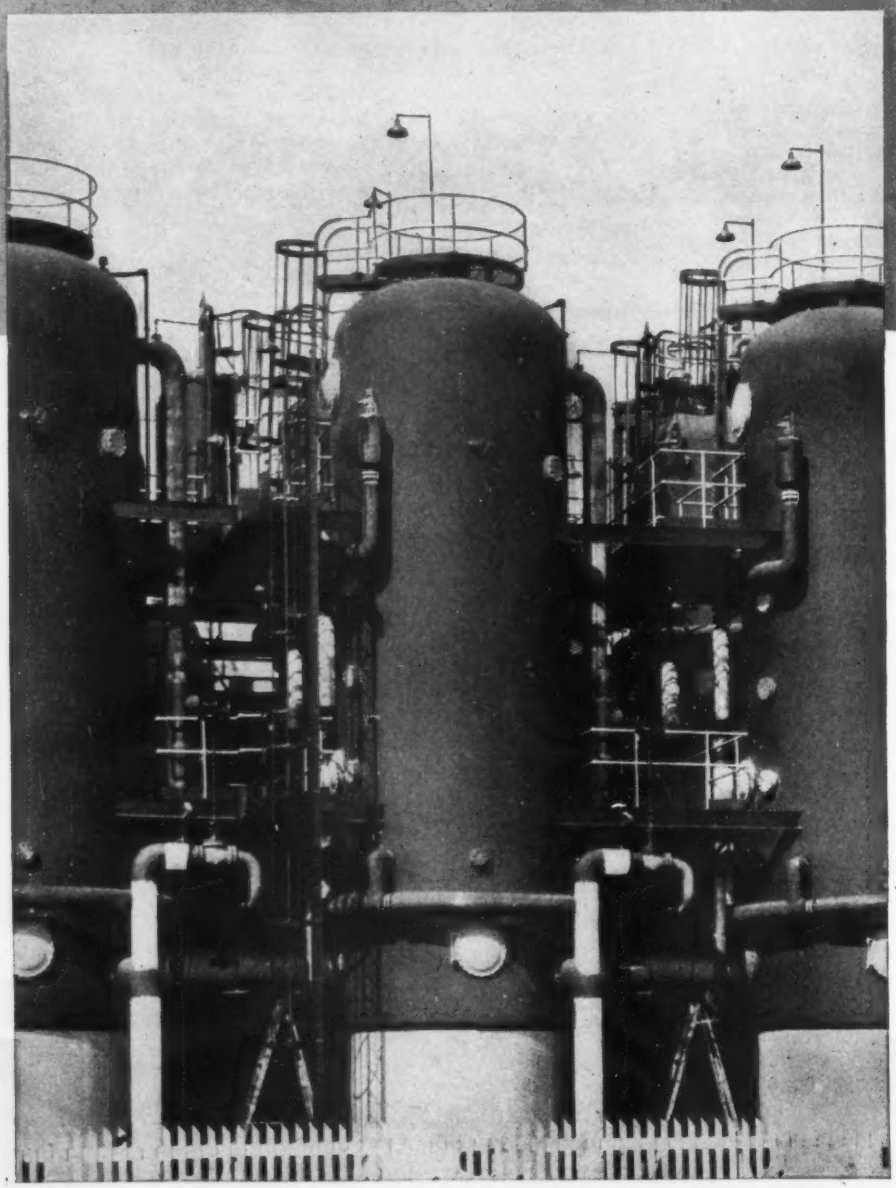


Fig. 3—Relative cost of operation of electric generating plants

A MILLION-VOLT



SEARCH LEADS TO SAFER PRESSURE VESSELS

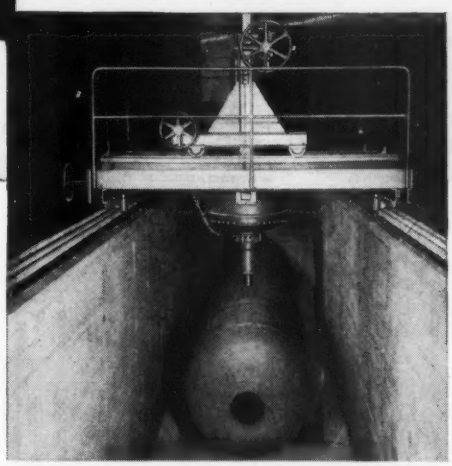


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TABLE 1—GROUP "A" PLANTS—1,500 TO 2,500 KW. CAPACITY
(Average Kw.-hr. Generated Per Mo. = 832,870)

	Average monthly expense	Average cost per kw.-hr. (cents)	Per cent of total
Operating labor	$1,313	.158	22.1
Repair labor and material	623	.074	10.6
Teaming and trucking	58	.007	1.0
Small tools and supplies	233	.028	3.9
Miscellaneous	192	.023	3.2
Fuel	1,038	.124	17.5
Total direct operating expense	$3,457	.414	58.3
Compensation insurance	$14	.003	0.2
Social Security tax	14	.002	0.2
Ad valorem tax prorated	185	.022	3.1
Depreciation	1,853	.222	31.3
Interest on investment	409	.049	6.9
Total indirect operating expense	$2,475	.297	41.7
Total expense	$5,932	.711	100.0

Average plant capacity utilized = 62 per cent
Plant investment range — $108 to $122 per kw. capacity
Generating cost range — 0.677 to 0.760 cent per kw.-hr.

TABLE 2—GROUP "B" PLANTS—500 TO 1,500 KW. CAPACITY
(Average Kw.-hr. Generated Per Mo. = 358,970)

	Average monthly expense	Average cost per kw.-hr. (cents)	Per cent of total
Operating labor	$435	.121	15.9
Repair labor and material	485	.135	17.7
Teaming and trucking	9	.003	0.3
Small tools and supplies	197	.055	7.2
Miscellaneous	45	.013	1.6
Fuel	402	.112	14.7
Total direct operating expense	$1,573	.439	57.4
Compensation insurance	$4	.001	0.2
Social Security tax	4	.001	0.2
Ad valorem tax prorated	88	.024	3.2
Depreciation	875	.243	32.0
Interest on investment	193	.054	7.0
Total indirect operating expense	$1,164	.323	42.6
Total expense	$2,737	.762	100.0

Average plant capacity utilized = 60 per cent
Plant investment range — $91 to $159 per kw. capacity
Generating cost range — 0.649 to 0.876 cent per kw.-hr.

Therefore it appeared desirable to divide the generating plants in this study into four groups as follows:

Group A—1,500-2,500 kw. capacity

Group B—500-1,500 kw. capacity

Group C—100-500 kw. capacity

Group D—Less than 100 kw. capacity.

Relative costs of generating electrical energy for the four groups of plants are illustrated in Fig. 3.

Group A—1,500-2,500 kw. capacity.—The number of plants considered in this group is limited to three. This size of plant approaches that of a small utility plant, and is capable of producing sufficient electrical energy to supply a small town. Normally a plant of this capacity is installed where there is a possibility of operating several hundred large producers, or more than a thousand small wells with electrical power.

In Table 1 the average generating expense is shown to be $5,932 per month, and based on an output of 832,870 kw.-hr. per month, the operating expense becomes 0.711 cent per kw.-hr. Depreciation accounts for 31.3 per cent of the total operating charges.

Group B—500-1,500 kw. capacity.—Cost of operation of the plants shown in Group B amounted to an average of $2,737 per month, or .762 cent per kw.-hr. output, based on an output of 358,970 kw.-hr. per month (Table 2). Indirect expense was 57.4 per cent of the total generating expense.

Group C—100-500 kw. capacity.—No operating labor was charged to this group of plants. Total generating expense averaged $507 per month, or 1.325 cents per kw.-hr. output, as shown in Table 3. This compares with approximately .71 cent per kw.-hr. output for the larger plants. Repairs accounted for 31 per cent of the total generating expense, and all direct charges 54.2 per cent of the total.

Group D—Less than 100 kw. capacity.—The majority of the generating plants studied fell in this group. Average operating expense amounted to $203 per month, and 1.299 cents per kw.-hr. generated. This compares with approximately .71 cent for the larger plants. Direct operating expense (mostly for repairs) was 59.1 per cent of the total generating expense (Table 4).

Considerations of Operating Expense

The fact that generating expense has been broken down into its component parts and calculated on a per kw.-hr. basis makes it possible to determine the approximate cost of generating electrical energy for any given set of conditions. For instance, if there be no charge for fuel, this item may be deducted, the cost per kw.-hr. for all other items added, and the sum multiplied by the approximate kw.-hr. to be generated, giving the average operating expense. Should fuel charges be other than shown, a correction should be made in fuel charges per kw.-hr. which, added to all other charges in terms of cost per kw.-hr., will give the total generating expense per kw.-hr.

District expense was not included in any of the cost statements as this is an arbitrary figure and would likely be unaffected whether electrical energy be purchased or generated. Many operators discuss the low cost of operation of electrical generating plants

TABLE 3—GROUP "C" PLANTS—100 TO 500 KW. CAPACITY
(Average Kw.-hr. Generated Per Mo. = 38,300)

	Average monthly expense	Average cost per kw.-hr. (cents)	Per cent of total
Operating labor—None			
Repair labor and material	$157	.410	31.0
Teaming and trucking	11	.029	2.2
Small tools and supplies	57	.149	11.2
Miscellaneous	6	.016	1.1
Fuel	44	.115	8.7
Total direct operating expense	$275	.719	54.2
Compensation insurance—None			
Social Security tax—None			
Ad valorem tax prorated	$18	.047	3.6
Depreciation	176	.460	34.7
Interest on investment	38	.099	7.5
Total indirect operating expense	$232	.606	45.8
Total expense	$507	1.325	100.0

Average plant capacity utilized = 32 per cent
Plant investment range — $100 to $150 per kw. capacity
Generating cost range — 1.307 to 1.500 cents per kw.-hr.

TABLE 4—GROUP "D" PLANTS—BELOW 100 KW. CAPACITY
(Average Kw.-hr. Generated Per Mo. = 15,640)

	Average monthly expense	Average cost per kw.-hr. (cents)	Per cent of total
Operating labor—None			
Repair labor and material	$83	.531	40.8
Teaming and trucking—None			
Small tools and supplies	15	.096	7.4
Miscellaneous	5	.032	2.5
Fuel	17	.109	8.4
Total direct operating expense	$120	.768	59.1
Compensation insurance—None			
Social Security tax—None			
Ad valorem tax prorated	$6	.038	3.0
Depreciation	63	.403	31.0
Interest on investment	14	.090	6.9
Total indirect operating expense	$83	.531	40.9
Total expense	$203	1.299	100.0

Average plant capacity utilized = 44 per cent
Plant investment range — $84 to $171 per kw. capacity
Generating cost range — 0.773 to 2.468 cents per kw.-hr.

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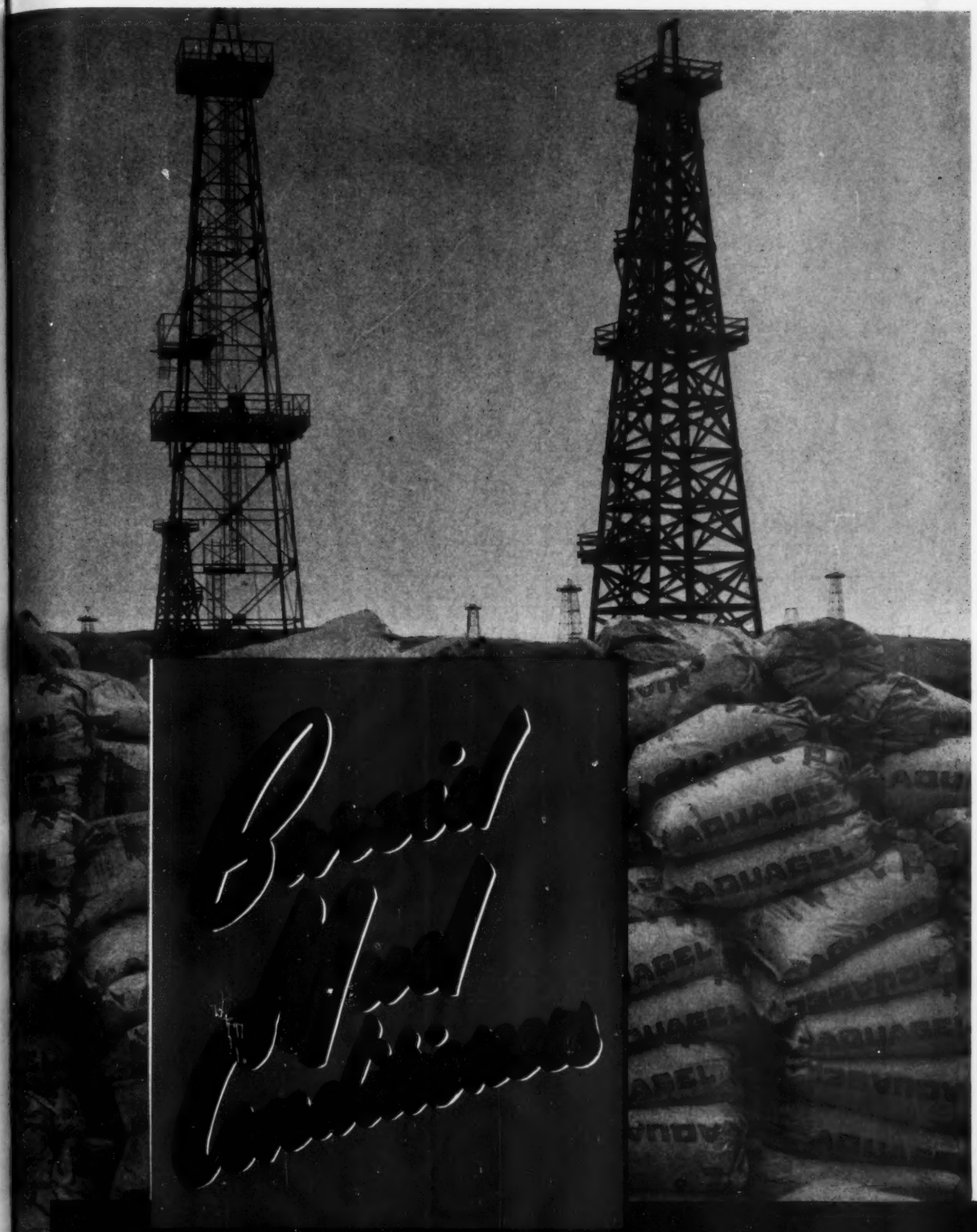

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TABLE 5—COMPARISON OF GENERATING COSTS USING NATURAL GAS AND BUTANE FUEL
Plant C—Output: 38,000 Kw.-hr. Per Month

	Natural gas			Butane		
	Per mo.	Per kw.-hr. (cents)	Per cent of total	Per mo.	Per kw.-hr. (cents)	Per cent of total
Repair labor and material	$157	.410	31.0	$157	.410	22.3
Teaming and trucking	11	.029	2.2	11	.029	1 6
Small tools and supplies	57	.149	11.2	57	.149	8.1
Fuel	44	.016	8.7	240	.632	34.1
Miscellaneous	6	.115	1.1	6	.115	0.9
Total direct operating expense	$275	.719	54.2	$471	1.335	67.0
Ad valorem tax prorated	$18	.047	3.6	$18	.047	2.6
Depreciation	176	.460	34.7	176	.460	25 0
Interest on investment	38	.099	7.5	38	.099	5.4
Total indirect operating expense	$232	.606	45.8	$232	.606	33.0
Total generating expense	$507	1.325	100.0	$703	1.941	100.0

Purchased power charges for 38,000 kw.-hr. would be $553* or 1.452 cents per kw.-hr.
*Based on rate schedule of one utility.

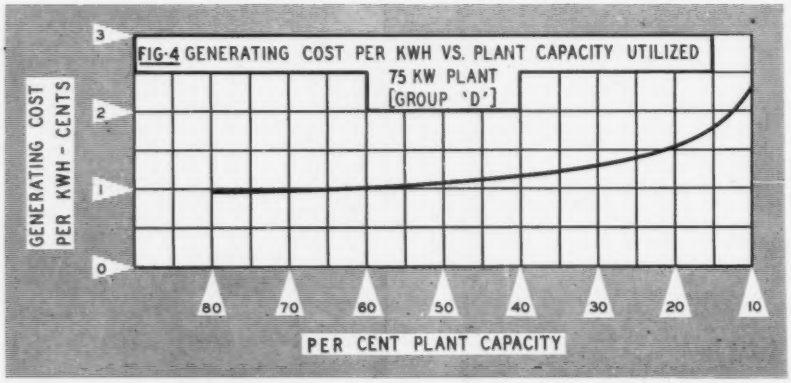

Fig. 5

and speak of generating costs of 0.5 cent per kw.-hr. output. Generally in such instances, only the direct operating cost is included.

Purchased Liquid Fuel

Generating plants in some instances have been installed in areas where natural gas was available for fuel, and later when the supply of natural gas diminished, it became necessary to purchase fuel. Table 5 has been prepared to show the cost of operation of the average plant in Group C operating on natural gas, as compared to the cost of operation using butane for fuel. It will be noted that the cost of butane alone amounted to 0.632 cent per kw.-hr. and the generating cost increased to 1.941 cents per kw-hr., which in many cases would be greater than the cost of purchased electrical energy. It is generally concluded that should liquid fuel or high-cost natural gas have to be purchased at any time during the operation of a generating plant, it would be more economical to purchase rather than generate electrical energy.

Capacity of Plant Utilized

There is one factor that plays an important part in the determination of generating costs and that is the fixed charges. In the generating expense tables it is shown that indirect operating expense or fixed charges are approximately 40 per cent of the

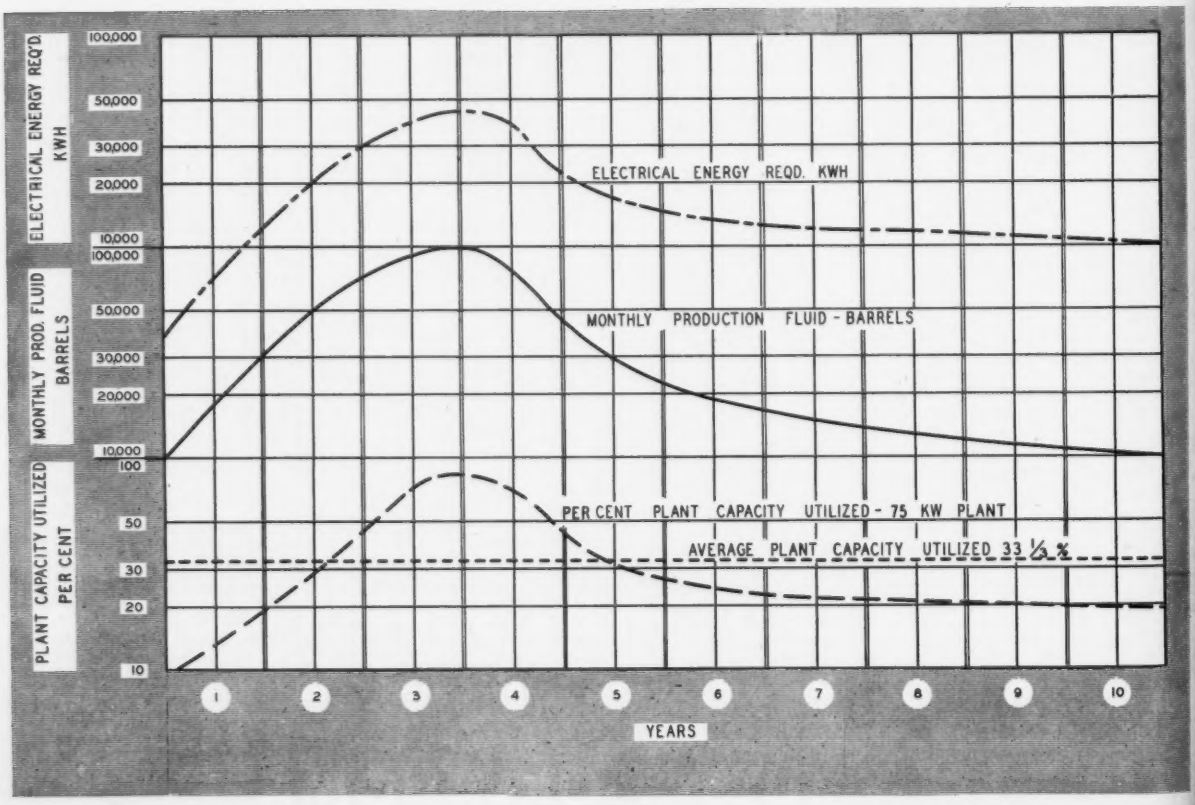

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TABLE 5—COMPARISON OF GENERATING COSTS USING NATURAL GAS AND BUTANE FUEL
Plant C—Output: 38,000 Kw.-hr. Per Month

	Natural gas			Butane		
	Per mo.	Per kw.-hr. (cents)	Per cent of total	Per mo.	Per kw.-hr. (cents)	Per cent of total
Repair labor and material	$157	.410	31.0	$157	.410	22.3
Teaming and trucking	11	.029	2.2	11	.029	1 6
Small tools and supplies	57	.149	11.2	57	.149	8.1
Fuel	44	.016	8.7	240	.632	34.1
Miscellaneous	6	.115	1.1	6	.115	0.9
Total direct operating expense	$275	.719	54.2	$471	1.335	67.0
Ad valorem tax prorated	$18	.047	3.6	$18	.047	2.6
Depreciation	176	.460	34.7	176	.460	25 0
Interest on investment	38	.099	7.5	38	.099	5.4
Total indirect operating expense	$232	.606	45.8	$232	.606	33.0
Total generating expense	$507	1.325	100.0	$703	1.941	100.0

Purchased power charges for 38,000 kw.-hr. would be $553* or 1.452 cents per kw.-hr.
*Based on rate schedule of one utility.

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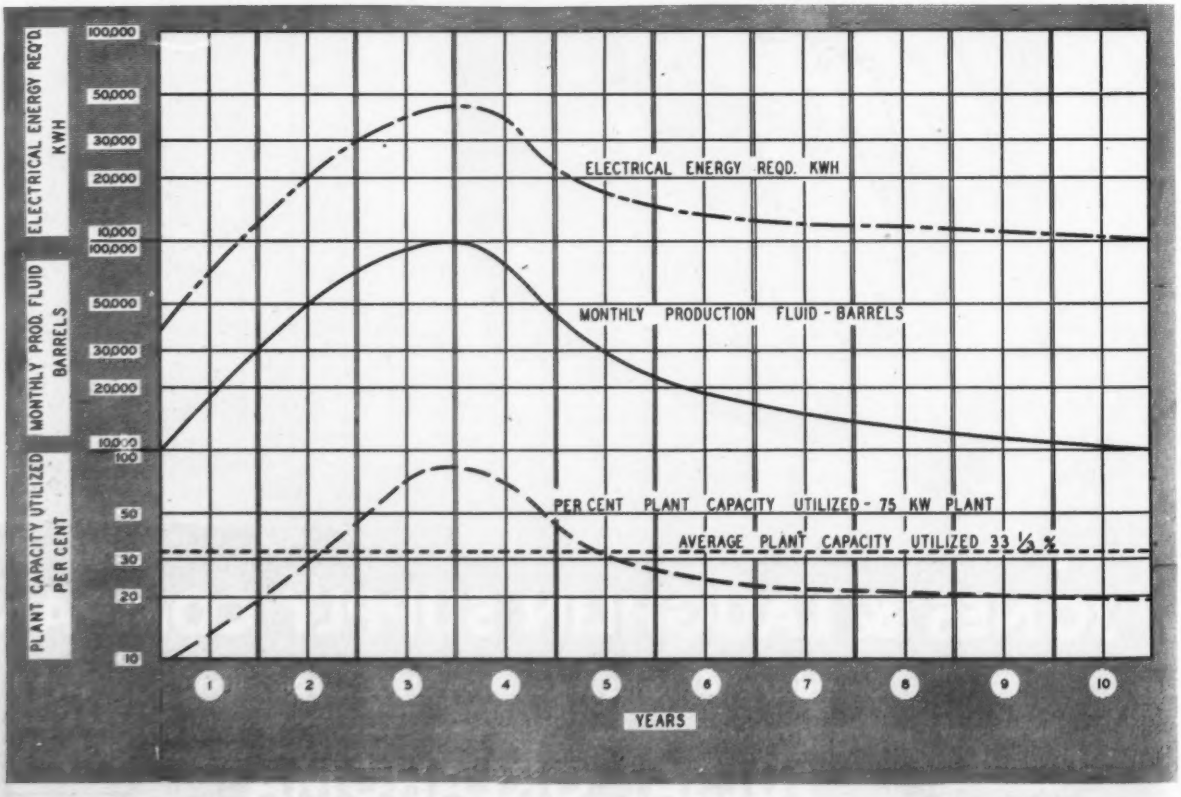

total plant expense. Obviously, as the plant output decreases, the cost per kw.-hr. output increases. This is shown graphically in Fig. 4. For economical operation, generating units should be selected that will operate near their rating during peak loads. This is often difficult to accomplish. Due to the nature of pumping loads and the downtime incurred, lease generating plants seldom are able to operate above 80 per cent of their over-all rated capacity. Some plants experience excessive mechanical trouble as the 80 per cent figure is approached.

The expected load over a period of years should be well understood before selection of a generating unit is made. The loads on a lease plant may increase or decrease, depending on the type of oil reservoir that is being produced. In general, the plant load will parallel the pool fluid production curve. This is illustrated in Fig. 5. Note that the average load on the plant over a period of 10 years amounted to only one-third of the rated capacity of the plant.

Some companies in determining the size of large generating plants prefer to install generating equipment for approximately two-thirds of the maximum expected peak load and to purchase electrical energy to handle the peak requirements until the load on the system decreases and can be handled by the company plant. In the case of small lease plants, the equipment is usually selected to handle the peak loads. Small plants may therefore be operating at a small percentage of their rated output and the generating cost per kw.-hr. may be comparatively high. Once the plant has been fully depreciated, the operating expense reaches a satisfactory level.

Usually a standby generating unit is not installed in a plant that has a capacity of 100 kw. or less. Most of the leases equipped with this size plant have wells which pump off and any downtime of a few hours may not materially affect the daily production. In large plants where several generating units are employed, a standby unit is commonly used. An advantage in using several generating units in a plant lies in the fact that a generating unit may be transferred elsewhere as the load on the plant decreases.

Salvage Value of Electrical Equipment

The cost of operating a generating plant is of course dependent in part on the rate of depreciation, which was assumed to be 10 per cent a year. It is a well-known fact that some of the plant equipment may have a service life of 20 or more years. There are so many variables affecting the salvage value of equipment that no attempt is made to say what per cent of the total plant cost would likely be recovered in the form of salvage at the end of 10 years. Perhaps a salvage value of 20 per cent of plant costs would be conservative.

Plant-Operating Difficulties

Anyone contemplating the installation of a generating plant should have some knowledge of the types of trouble that may be expected. Plant electrical repairs, amounting to approximately 3 per cent of the total operating expense, are of minor importance.

Engine-repair expense, as shown in Tables 1 to 4, accounts for approximately 40 per cent of the total direct plant operating expense. It should be apparent that careful selection of engine is imperative, and the type of engine employed may mean the difference between successful and unsuccessful operation of an electrical generating system where small plants are involved. Approximately half the engine repair expense is for labor.

One factor should be made clear, and that is that an engine should have ample capacity to handle any load imposed on the generator. Some companies prefer to select an engine having a horsepower rating of one and a half to twice the kilowatt rating of the generators at 80 per cent power factor, the engine rating being based on the A.P.I. engine rating for continuous operation.

A factor not to be overlooked in the selection of an engine for a generating plant is the amount of engine-flywheel capacity, or WD^2. Peak loads will be imposed momentarily on a generating plant due to starting of pumping motions; that is, operation of motors or the synchronization of a group of wells may be such that the motors will draw maximum amounts of current simultaneously. To care for these peak loads, especially where large motors are employed, the engine must have sufficient kinetic energy to provide against a decrease in the speed of the prime mover, which might decrease the generated voltage sufficiently to cause trouble. The coefficient of engine-speed fluctuation is recommended to be a maximum of 1/125.

Small generating plants that do not have standby units will be idle on an average of approximately 2 per cent for repairs to the engines, changing oil, replacement of generator brushes, etc. The uncorrected power factor for electrical systems serving pumping wells will range from approximately 45 to 65 per cent. This presents no problem as long as the electrical equipment is not operating at capacity. However, capacitors on the distribution line will improve power factor reducing power losses and load

TABLE 6—COST PURCHASED ELECTRICAL ENERGY VS. COST OPERATION LEASE GENERATING PLANT

Year	Average bbl. fluid prod. per month	Est. kw.-hr. consumed per bbl. fluid per month	Total kw.-hr. used per month	Average cost purchased electrical energy* Per month A	Per month B	Per kw.-hr., cents A	Per kw.-hr., cents B	Average cost lease generated electrical energy Per month	Per kw.-hr. (cents)	Avg. plant capacity utilized (per cent)†
1	18,000	0.40	7,200	$121	$129	1.68	1.79	$138	1.92	13.2
2	50,000	0.40	20,000	312	288	1.56	1.44	237	1.19	36.6
3	90,000	0.45	40,500	566	429	1.40	1.06	394	0.98	74.0
4	78,000	0.50	39,000	552	418	1.42	1.07	383	0.99	71.4
5	28,000	0.60	16,800	265	246	1.58	1.47	212	1.27	30.7
6	19,000	0.70	13,300	224	202	1.69	1.52	185	1.39	24.3
7	15,000	0.80	12,000	209	186	1.74	1.55	175	1.46	22.0
8	13,000	0.90	11,700	207	182	1.77	1.56	173	1.48	21.4
9	11,500	1.00	11,500	203	181	1.77	1.57	171	1.49	21.0
10	10,500	1.00	10,500	192	171	1.83	1.63	164	1.56	19.2

Average cost purchased electrical energy per month, over 10 years—Utility A	$285
Average cost purchased electrical energy per month, over 10 years—Utility B	243
Average cost lease generated electrical energy per month, over 10 years	223
Average saving with lease generated electrical energy per month, over 10 years—Utility A	62
Average saving with lease generated electrical energy per month, over 10 years—Utility B	20
Total saving with lease generated power over purchased power, over 10 years—Utility A	7,440
Total saving with lease generated power over purchased power, over 10 years—Utility B	2,400
	Cents
Average cost purchased electrical energy per kw.-hr.—Utility A	1.56
Average cost purchased electrical energy per kw.-hr.—Utility B	1.33
Average cost lease generated electrical energy per kw.-hr.	1.23

*Calculated using utility rate schedules. †Based on 75 kw. plant. A = First utility. B = Second utility.

on the generating unit, which is important in some circumstances.

Purchased Power vs. Generated Power

It should be obvious that it is impossible to generalize as to whether a lease should be furnished electrical energy from a utility system, or a generating plant should be installed. In most areas the amount of interruption on a utility system is a fraction of the downtime that can be expected with a small lease plant. Each project must be analyzed individually, and the cost of extension of the utility distribution system to a lease must be given due consideration.

Large, as well as small, company generating plants have been operated at a saving compared with the cost of purchased electrical energy. However, some companies have had to purchase liquid fuel and the consequent cost of operation became more than the unit purchase price of electrical energy from a utility.

The profitability of generating electrical energy on a lease is frequently discussed. Many operators have shown considerable savings over what electrical energy would have cost if it were purchased rather than generated. On the other hand, some generating plants are now being operated when the over-all cost of operation is greater than the cost of purchased power. Some operators prefer to purchase electrical energy at a higher cost than they could operate generating plants for the simple reason they do not have to worry about load factors, operating labor, etc.

A hypothetical case was set up for the purpose of analysis to determine which method of operation may be more economical. Let it be assumed

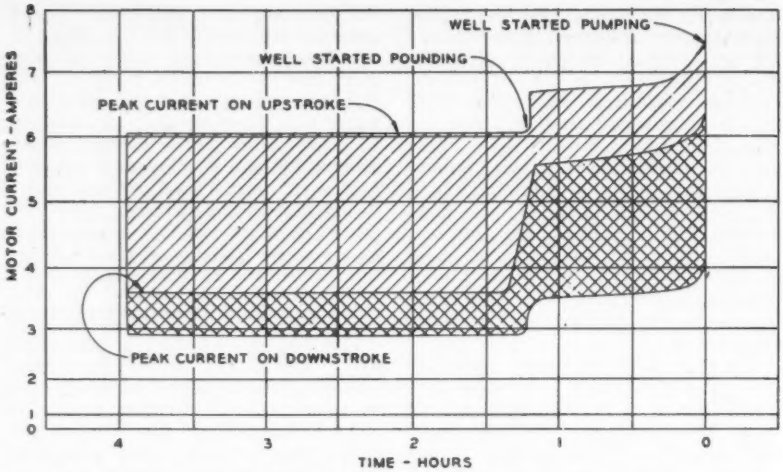

Fig. 7—Typical ammeter chart on Louden pool well, Illinois. Time switch control

that a group of wells is expected to produce for a period of 10 years in accordance with the decline curve shown in Fig. 5. The calculated electrical energy required to produce the fluid is shown in Table 6 and is plotted in Fig. 5.

Should a 75-kw. generating plant be installed for this purpose, the load on the plant would be a maximum of approximately 83 per cent of its capacity at the end of 3 years. The plant load would gradually decrease and at the end of 10 years the plant would be operating at less than 20 per cent capacity.

The cost of purchased electrical energy, based on typical rate schedules, is compared with the cost of generated electrical energy in Fig. 6. Cost of operation of the plant was based on the average cost of plant operation as previously discussed for plants in Group D.

The rate schedule for purchased electrical energy is by no means constant among the various utilities serving the oil fields. The cost of purchased electrical energy per kw.-hr. is dependent to some extent on the type and cost of fuel in the particular area involved.

In comparing the cost of generating electrical energy on a lease with that of purchased electrical energy, it was decided to use the rate schedule of the two utilities which are located in different states. The saving with lease-generated power over purchased power was found to be $62 per month using the rate schedule for utility A, and $20 per month saving with lease-generated power where utility B rate schedule was applied. Over a period

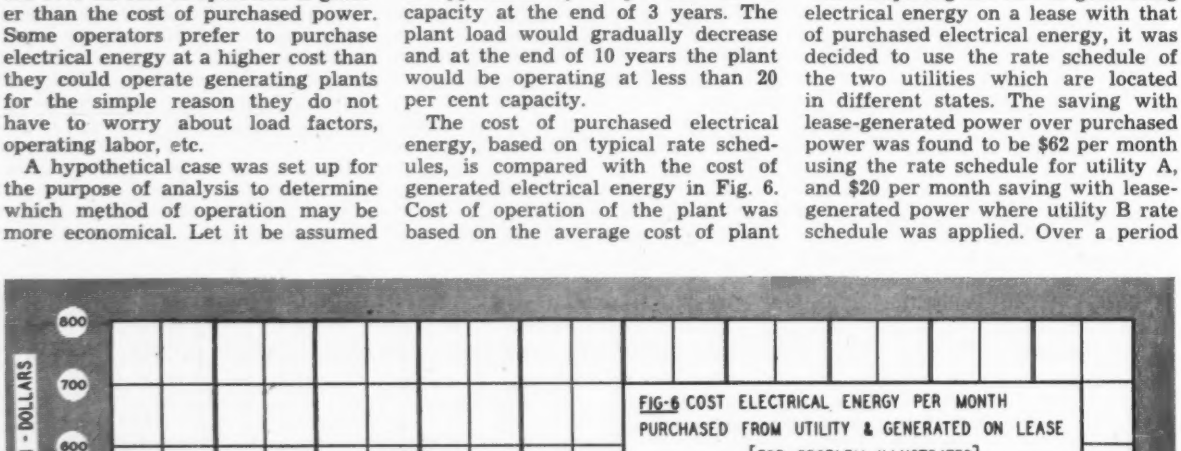
FIG-6 COST ELECTRICAL ENERGY PER MONTH
PURCHASED FROM UTILITY & GENERATED ON LEASE
[FOR PROBLEM ILLUSTRATED]
PURCHASED ELECTRICAL ENERGY - UTILITY 'A'
PURCHASED ELECTRICAL ENERGY - UTILITY 'B'
LEASE GENERATED ELECTRICAL ENERGY
COST ELECTRICAL ENERGY PER MONTH - DOLLARS
YEARS

of 10 years, it would cost approximately $7,400 more to purchase electrical energy than to operate a generating plant, using the rate schedule of utility A in the example cited. The cost of generating electrical energy in this case is shown to be 1.23 cents per kw.-hr. as compared to the calculated cost of 1.56 cents for purchased electrical energy from utility A and 1.33 cents per kw.-hr. from utility B.

Recent Developments

Wells pumping off.—It was previously mentioned that the kw.-hr. consumption per barrel of fluid lifted increased as the well production reached a stage where they pumped. Many operators do not make a comprehensive study to determine the time required for a well to pump off and to adjust time clocks accordingly so that wells may be automatically shut down at predetermined intervals.

Some of the major oil companies have done considerable experimental work with electrical recording instruments to determine when a well pumps off. Best results have been obtained with a recording ammeter and wattmeter. In Fig. 7 is a typical recording ammeter chart showing a well pumping off. Pumping of the well is controlled automatically by an electric clock. A reduction of 25 per cent in electrical energy consumption has been possible by some operators through studies made of wells pumping off using recording instruments.

Maximeter or thermal demand meter.—This instrument registers the heating effect of the fluctuating current in a motor and is useful in determining whether a motor is overloaded.

Three-element relay.—Certain types of three-phase motors will stall when one phase is opened, the current in the other two phases may increase to between 200 and 300 per cent of normal three-phase running current. Experimental work is being conducted using three thermal elements to protect the large oil-field motors from single phasing and overload, and thereby protect the motor from burning out.

Time delay switches.—Following a power interruption on an electrical system, the system would be overloaded considerably if all wells commenced to pump simultaneously, as the motor starting current may be some five times normal operating current. To avoid overloads on systems and to minimize maximum demand, a time delay relay has proved useful. The wells in a pool may be arranged in groups and each group be operated by a time delay switch, which is controlled by a small synchronous motor. When power is restored, each group of wells starts up automatically at predetermined intervals. Adjustments on some time delay relays can be made up to 100 seconds.

A.P.I. DIGESTS

Of papers presented at the meeting of Eastern Section, Division of Production, American Petroleum Institute, at Pittsburgh, June 13-14

Gas-Recovery Systems

DOUGLAS ROGERS, JR., South Penn Natural Gas Co., Parkersburg, W. Va.

GAS recovery systems have been developed to a high degree of efficiency in the Bradford field in Pennsylvania and New York. These systems recover solution gas from separators and stock tanks and supplement the lease fuel. The gas is removed at low pressure or vacuum from vapor-tight systems which are protected by safety devices. These systems can be operated by automatic controls and when properly designed and installed require very little attention and maintenance expense. Gas recovery is profitable only in areas where natural gas is costly. For maximum efficiency and financial success the installation of such systems should always be preceded by a thorough study of the property, its production, and facilities.

In a typical gas-recovery system at Bradford, oil, gas, and water enter the separator tank from the lead line (a bleeder line being used when necessary to take the gas directly to the separator dome and thus prevent surging). Water is siphoned from the bottom of the separator and oil gravitates to stock tanks. The gas-recovery line takes gas from the top of the stock tanks and from the separator dome. Liquid seals placed in the line connecting the separator tank to the stock tanks and in the lines between the stock tanks, seal off the tanks from each other.

The gas-recovery line delivers the solution gases either directly to a vacuum pump or to a vacuum gathering system. To guard against excessive pressures or vacuum being exerted on the tanks or separator a pressure-relief device is connected to the gas-recovery line. This is a specially built liquid seal which vents to the atmosphere whenever the pressure or vacuum in the system exceeds predetermined limits. Some companies use separators in which the oil and water levels automatically adjust the outlet flow by float-operated valves. These may be equipped with baffles or perforated pipes which break up the mixture entering the chamber and help to "strip" it of its solution gas. The lower float, which operates the water outlet valve, moves up and down in a cylinder. This cylinder is closed at the top and open at the bottom, thus preventing the entrance of viscous oil-water emulsions which might disrupt the critical balancing of the float. To prevent the loss of such emulsified material, a "slop" tank is employed. This tank receives the water runoff from the separator and performs a secondary separation. Slop tanks also help to reduce losses caused by stuck valves, freezeups, and excessive fluctuations in fluid flow. Rapid changes in flow may overload the separator or its outlet lines and cause loss of oil. It is a good policy when installing such equipment to provide a considerably larger capacity than is necessary to meet conditions of normal flow.

In the installations, the gas-recovery lines may be connected to a vacuum pump and the gas boosted into the fuel lines. One type of automatic installation is electrically controlled, using vaporstat mercury switch which can be set to start and stop a motor-driven vacuum pump at any desired pressure or vacuum. Another type of installation uses a gasometer to regulate the pressure.

One operator is known to have saved $400 per month in fuel costs by installing a gas-recovery system. Another achieved savings of more than $10,000 per year. Still another experienced increases of from 5-15 per cent in oil and gas production on several leases.

Marble Shooting

J. GORDON BURCH, Burch Agate Torpedo, Borger, Tex.

WELLS get sick. A sort of skin disease attacks the walls of the well at the pay section sealing the surface of the formation so effectively that oil cannot enter from the naturally porous oil-bearing strata. This condition does not extend more than ¼ in. into the formation, but is anchored firmly to the formation and is difficult to remove. There are various forms of this encrustment. Paraffin is quite effective in choking a well. Most of the encrustments, however, are mineral, having their origin in the chemical action of gypsum and other salts present in the well. They embed themselves in the formation and build out from the wall of the well with a sleek glossy, impervious substance.

The tool consists of two concentric fragile tubes. Glass marbles fill the annular space between the 3-in. outer tube and the 1⅝-in. tube in the center which contains the explosive. The marbles harness the energy of the explosive, absorbing and transmitting it uniformly. The tool fires 258 marbles per linear foot into the congested face of the pay section. When the increasing resistance of the formation stops penetration, the marbles disintegrate violently with a sunburst blast toward the center of the bore. In pipe shooting, the explosive has enough power to shred the pipe without junking the hole. The marbles have been used in salt-water-disposal and input wells congested with solids. Desired sections of squeeze jobs have been reopened, underreamers started in drill holes, and keyseated holes corrected.

Oil Economics

H. M. McCLURE, Independent Producer, Alma, Mich.

CRUDE oil is now only 71 per cent of the 1926 base period. In marked contrast, all raw materials are over 120 per cent and wages over 180 per cent. Under a continuance of this program the future existence of the producing departments or companies can easily be measured by the amount of cash and crude reserves that now appear on their balance sheet, as no company large or small can survive through the years, when the principal item on their inventory is sold below the cost of replacement. When this condition exists it merely becomes a matter of liquidation.

Twenty-five per cent of the small operators disappeared since the recent war began, according to the records of the Internal Revenue Department. The industry needs these men for their genius, courage, and ability, and likewise the 4 or 5 billion barrels of reserves underlying our stripper wells are and will be highly important to our national economy. When we consider the fact that the majority of our new reserves have been found by the independent operators, generally with the assistance

and cooperation of the large companies, it behooves the entire industry to make certain that the small operators and the wildcatters have the proper incentive to continue their endeavors in this important segment of the business.

Design and Construction of Water Pumping Plants

GEORGE W. HOLBROOK, Bradley Producing Corp., Wellsville, N. Y.

FUNCTION of the "pressure plant," one of the most important units on a lease where the water-flooding method is practiced, is to supply the pressure to the flooding medium. Imparted to the water is the main source of energy for the whole operation of moving the crude oil in the sand to the producing wells. Requirements of pressure and quantity for such plants are discussed, and simple formulas for calculation of power given, along with discussion of site, building, storage tanks, pumps, prime movers, auxiliary equipment, piping, protective devices and operating variables. Some of these are:

The two prime factors are the quantities of water to be pumped and the pressure to be attained. In the Allegany field of New York State, input rates may be as low as ½ bbl. per day per foot of sand, even at the maximum pressures that can be carried. These conditions represent about the minimum water requirements, and the average figures for the Allegany field would be several times as much. In the Mid-Continent fields, some of the "looser" sands will take 10 bbl. per day per foot of sand, with less pressure than that due to the static head. Individual wells may take as much as 600 bbl. per day. Sand thickness, permeabilities, saturations of oil, water and gas, well spacings, and pressures to be carried, all affect the quantities required per acre, and the size of the project affects the size of the pressure plant to be built. In Bradford-Allegany fields, present tendency is toward the highest pressure that can be carried without bypassing, and this usually falls between 0.8 and 1.4 psi. for each foot of depth to the sand.

The "expected life" factor is a most important one in design. If a life of only 5 years is expected, and all the acreage available is to be developed at once, obviously a far different type of equipment will be selected than would be called for by a plant to operate for 25 or 30 years, and where there is a large acreage available for future development.

An important auxiliary is the bypass valve used to control pressures. With positive displacement pumps, this is almost a necessity if an even discharge pressure is to be held. This is usually a spring-loaded valve connected from discharge to suction lines, the spring tension being adjustable to secure regulation. Various devices to protect the pressure unit in event of trouble are frequently provided: high cooling water temperature shutoffs, overheated bearing shutoff, and low-intake water-level shutoff.

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Safety in the Oil and Gas Field

PAUL M. WALTON, Industrial Gas Corp., Newark, Ohio.

FIRST presenting background material on the problem of accidents, frequencies as to types are listed, with slips and falls registering as 30 per cent, handling materials and moving machinery 20 per cent each, falling objects 14 per cent, fires and explosions 10 per cent, and accidents from protruding nails as the remaining 6 per cent. According to degree of severity, moving of machines accounted for 50 per cent, slips and falls were 33 per cent, fires and explosions 12 per cent, and handling materials 5 per cent.

Precautions and helpful safeguards were given as to different causes of accidents. Corrections for unsafe practices should be handled by adequate training program, including: (1) Good housekeeping, (2) proper use of tools, (3) proper way to handle material, (4) how to handle gas and oil, (5) the standard Red Cross First Aid Course, and (6) proper selection of clothing.

Reconditioning of Drowned Gas Wells

S. T. YUSTER, The Pennsylvania State College, State College, Pa.

REVIVAL of intentionally or accidentally drowned gas-producing or injection wells is of prime interest to oil and gas producers. Water from leaky casing, excessive coning due to too rapid withdrawals, necessary drowning to control a wild well or make repairs may all cause an almost permanent harm to a gas well by reducing its capacity. In all these cases the effect of the presence of water is to retard the flow of gas from or into the formation.

The application of high-vapor-pressure, low-surface-tension liquids which are completely miscible with water removed the plugging action almost completely. Some of the liquids used with success were acetone and a nine-to-one mixture of acetone and diethyl ether. Methods were developed for the safe drowning of gas wells so that a well could be brought back to production after treatment with very little change in productivity.

The paper essentially is a review of two previously published articles ("The Drowning and Revival of Gas Wells," by Yuster and Sonney, and "Treatment of Gas Sands to Prevent or Overcome Detrimental Effect

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of Water," by Sonney and Williams, which appeared in the April and June 1944 issues of The Producers Monthly), the subject being requested by the program committee to stimulate further consideration of the methods for overcoming drowning difficulties.

Source and Purification of Water Supply

GEORGE W. HOLBROOK, Bradley Producing Corp., Wellsville, N. Y., and A. R. ELLENBERGER, Smith-Newton Oil Co. Lab., Bradford, Pa.

VARIOUS water-supply sources for flooding operations, methods of obtaining the water, and methods of treating it before injection are discussed. Object of treatment is to obtain water that is not corrosive to equipment, will not clog or plug the sand in the input wells, and will give maximum recovery of oil. The various impurities found in water are discussed, methods of treatment are given, and costs and operating requirements are stated.

Majority of present water floods are supplied by subsurface waters obtained through wells from either rock or gravel formations. Brines have been used to some extent for water flooding, and may be classified as a special type of "rock" water. If supply wells are spaced too near together, there will be interference and neither will produce its maximum amount. The interference will not be serious ordinarily if wells are 500 ft. apart or more. At less than 200-ft. spacing, the reduction of supply by interference will be appreciable, and greater space should be used if possible. Wells to be produced by air lift should be drilled deep enough to allow a submergence of the air jet of about 65 to 70 per cent.

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Gas Requirements in Gas Drive Recovery

S. T. YUSTER and R. J. DAY, The Pennsylvania State College, State College, Pa.

THIS paper discusses the effect of pressure gradients, permeability, viscosity, and connate water saturations, both from the laboratory and field standpoint on the gas requirements for recovery by gas drive. Based upon laboratory behavior, field equations are derived for obtaining the rate and cumulative quantity of oil produced from a property as a function of time. These equations predicted the field behavior with a very small margin of error. Field evidence is given in support of the laboratory trend that the higher the drive gradients, the greater is the efficiency of oil recovery. Relationships are given for calculating the gas-oil ratio (or the quantity of gas to produce a barrel of oil) as a function of time and as a function of total liquid saturation.

Summarizations given included:

1. There is a linear relationship between the total liquid saturation in a laboratory core and the logarithm of the volume of gas necessary to reach that saturation.
2. Less gas and less time are required to produce a given quantity of oil at high-drive gradients than at low-drive gradients.
3. No definite trend of the gas requirements as a function of permeability can be indicated at the present time.
4. An increase in the viscosity of the oil requires a proportionate increase in the gas needed for recovery.
5. Connate water can substitute for residual oil saturation in the saturation-volume relationship, and gas requirements can be determined by substituting the total liquid saturation in the relationships defining the recovery behavior.
6. The recovery of oil is more complete in a sand containing connate water, and the higher the connate water saturation up to certain limits, the more complete is the recovery.
7. As a corollary to (6) it would appear desirable to increase the water saturation of an oil sand (with the proviso that the water wet the sand) having a low-connate-water saturation in order to increase the oil recovery.
8. The reciprocal oil-production rate is indicated to be a linear function of the cumulative time with a constant rate of gas input.
9. The cumulative production was found proportional to the logarithm of the ratio of the initial and final oil production rates over the period of time involved.
10. It was found theoretically that the gas-oil ratio is a linear function of the time with a constant rate of gas injection.
11. The logarithm of the gas-oil ratio is a linear function of the total liquid saturation.

Future Possibilities for Oil and Gas in New York State

E. T. HECK, New York State Science Service, Albany.

DIVIDING New York State into three districts, the general geology and possibility of finding additional oil and gas in each were discussed. Also described were productive belts of the other parts of the Appalachian territory, and several favorable areas for prospecting.

Deep Cable-Tool Drilling in the Appalachian Region

HAROLD W. HAUPT, Acme Drilling Co., Greensburg, Pa.

THE practices, success, and cost of deep cable-tool drilling in the Appalachian area were covered, based on actual experiences and operations.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

The Distex Process

Simplified Flow Diagram

What is the Distex process? We hear that it was developed during the war—H. H. G.

The Distex process is so named because it is a combination process of distillation and extraction. Hydrocarbons which have nearly the same boiling points (1°-3° C.) cannot readily be separated by plain fractionation, and if nonideal solutions (constant boiling mixtures are an extreme case) are produced between the hydrocarbons, fractionation cannot be used. As an example a heptane fraction of petroleum ranging from 80° to 119° C. may contain the following as well as many other hydrocarbons:

	°C.
2,2-dimethyl pentane	79.3
Benzene	80.1
2,4-dimethyl pentane	80.8
Cyclohexane	80.8
3,3-dimethyl pentane	86.0
1,1-dimethyl cyclopentane	87.2
2,3-dimethyl pentane	89.7
2-methyl hexane	90.0
1,3-dimethyl cyclopentane	90.7
Isopropyl cyclobutane	91.0
3-methyl hexane	91.8
1,2-dimethyl cyclopentane	91.8
3-ethyl pentane	93.3
Heptane	98.4
2,2,4-trimethyl pentane	99.2
Propyl cyclobutane	100.0
Methyl cyclohexane	101.2
Ethyl cyclopentane	103.1
2,2-dimethyl hexane	106.5
2,5-dimethyl hexane	109.3
2,4-dimethyl hexane	109.9
2,2,3-trimethyl pentane	110.2
Toluene	110.8
3,3-dimethyl hexane	111.5
2,3-dimethyl hexane	115.7
3,4-dimethyl hexane	116.5
4-methyl heptane	118.0
3-ethyl hexane	118.8
Cycloheptane	119.0
3-methyl heptane	119.1

Obviously, the separation of each of these hydrocarbons by plain fractionation is difficult or impossible, and in addition benzene and toluene each form nonideal solutions with most of the other hydrocarbons.

In the Distex process a solvent such as aniline, furfural, phenol, nitrobenzene, or chlorex is introduced as a scrubbing agent during the distillation. It is introduced near the top of the column and it appears at the bottom of the column admixed with the high-boiling product. The solvent should be higher boiling than the high-boiling product so that it can be recovered by stripping the hydrocarbons from it but not so high boiling that immiscibility occurs (which would be solvent extraction). The solvent alters the vapor-pressure characteristics (or activities) of the hydrocarbons so that their boiling points are spread apart. In general the paraffin (and isoparaffin) hydrocarbons tend to go overhead to a greater degree than their regular boiling points indicate. Thus separation of the hydrocarbons is facilitated and in the case of aromatics they may be somewhat disengaged from the azeotropic mixtures which they tend to form.

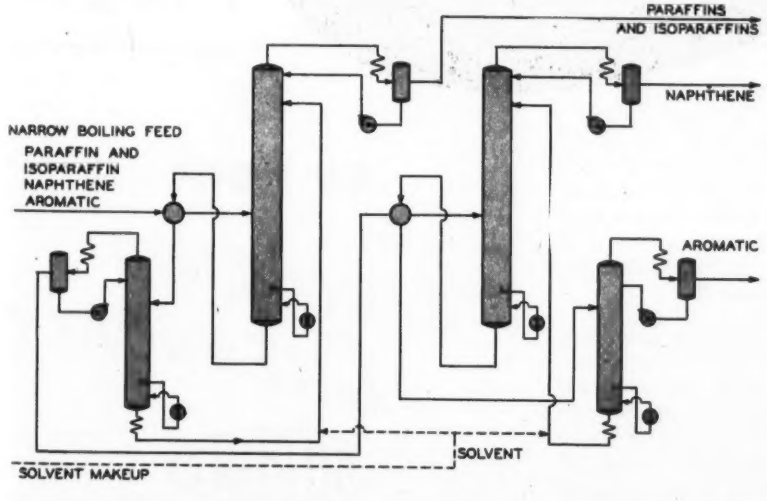


Fig. 1—Simplified flow diagram of the distillation extraction (Distex) process

The mechanism of this process is relatively simple (see Fig. 1). It amounts to introducing solvent near the top of the fractionating column, separating the solvent from the bottom product by stripping or distillation, and recycling the solvent. In practice the process becomes complicated when applied to a multicomponent mixture because one fractionator is required for each pair of close boiling hydrocarbons or each nonideal solution. In a most general way the first four hydrocarbons shown in the tabulation could be separated as follows:

1st tower < 2,2 and 2,4-dimethyl pentane **overhead**
1st tower < cyclohexane and benzene **bottoms**

2nd tower < cyclohexane **overhead**
2nd tower < benzene **bottoms**

The 2,2 and 2,4-dimethyl pentanes probably could not be separated by any common method.

Define "Reducing"

The word "reducing" is used frequently. Just what does it mean?—C.M.M.

This question bothered the author of this page 20 years ago and the situation is not entirely clear even today. Reducing is the term used to describe those distillation operations by which a topped crude oil is further distilled to leave behind a very high-boiling residue or to produce more distilled products than can be produced by plain topping. Several means of reduction are common:

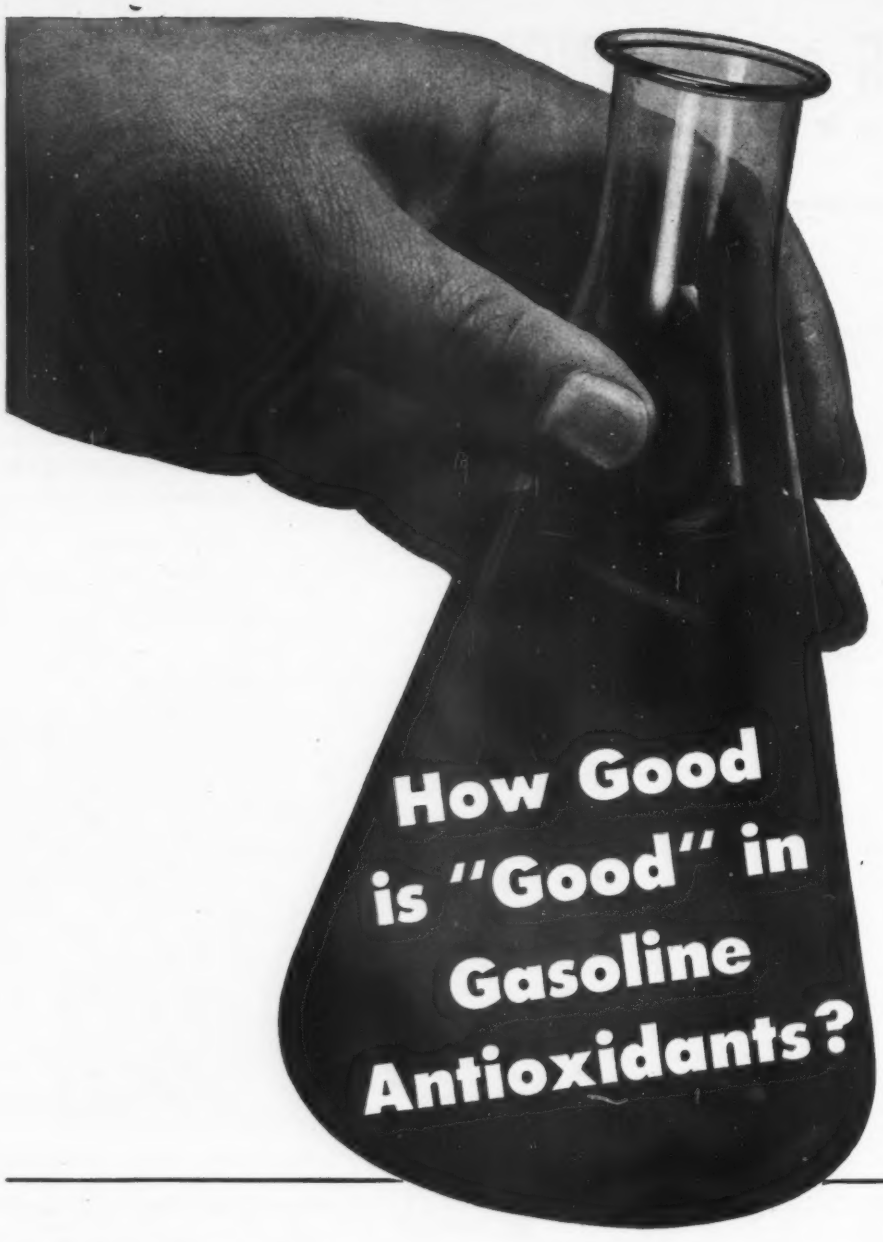
1. **Steam reduction.**—Heating to 550°-660° F. in the presence of large amounts of steam for many hours or as long as necessary to accomplish the reduction.

2. **Destructive steam reduction.**—Heating to 650°-750° F. in the presence of steam. The product may be somewhat cracked or viscosity broken.

3. **Delayed coking.**—Coking practiced without appreciable recycling of once-cracked material, usually for the purpose of eliminating excess carbon as coke or stated differently, to produce large amounts of cracking stock for thermal or catalytic cracking plants.

4. **Vacuum distillation.**—Distillation conducted at a subatmospheric pressure and usually in the presence of steam, practiced primarily for the production of distilled lubricating oil of light color or for the production of an asphalt residue.

5. **Carrier distillation.**—Continuous distillation process in which a large amount of somewhat low-boiling material is recycled through the process to reduce the vaporization temperature of the charge stock by reducing the partial pressure of the system.



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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Pressure Drop Through Tube Bundle of Exchanger

ON the back of this page is Fig. 1 by which the friction loss of a fluid flowing through the tube bundle of an exchanger can be estimated. It is based on the following conditions:

1. Single pass through the shell (see Notebook No. 77, January 19, page 99).
2. Half moon crossbaffles (see Notebook No. 84, March 9, page 93).
3. Petroleum oils. Other chemicals have a different relationship between viscosity and specific gravity.
4. Staggered tube arrangement. Reduce pressure drop by about 20 per cent for in-line tubes.
5. Velocity should be computed by means of Notebook No. 89 (April 20, page 165), although any other truly accurate method of determining velocity can be used.
6. A shell length of 10 ft. This means that the answer obtained with Fig. 1 should be corrected by ratio to the actual length of the shell, and also multiplied by the number of passes on the shell side.

This figure can, however, be applied to multipass exchangers or to disk and doughnut-type baffles by means of modifications which will be discussed later.

The figure was computed by means of the familiar Fanning equation for turbulent flow:

$$\Delta P = \frac{0.323\, f\, s\, u^2\, L'}{d'}$$

in which:

- ΔP = pressure drop, psi.
- f = friction factor based on Reynolds number
- s = specific gravity at average temperature
- u = velocity, ft. per second
- L' = equivalent length of flow, ft.
- d' = equivalent diameter of path of flow, in.

Introducing the equivalent length of flow (see Questions on Technology, Velocity in Shell of an Exchanger, The Oil and Gas Journal, February 2, page 62), and the equivalent diameter (Questions on Technology, March 9, page 85):

$$\Delta P = \frac{0.323\, f\, s\, u^2\, L}{k\, p}\left(A + \frac{5D}{x}\right)$$

in which:

- p = space between tubes (staggered arrangement), in.
- k = a constant which ranges from about 2.0 for closely spaced baffles to 2.25 for very few or no baffles
- L = actual length of bundle multiplied by number of shell passes
- A = a constant which depends mainly on velocity. It ranges from about 0.6 for the lowest velocities to 2.25 for high velocities (5 ft. per second)
- D = inside diameter of shell, ft.
- x = baffle spacing, ft.

Proper values of the constants k and A have been selected and incorporated into Fig. 1 so that nothing need be done about them in using the figure. Contractions and enlargements as the fluid flows from tube to tube and the friction created by the curving flow were cared for by multiplying the D/x term by 5.

Example 1.—A single-pass exchanger with nozzles 14 ft. apart measured along the shell has half-moon type baffles spaced at 9 in. The inside diameter of the shell is 18 in. According to Notebook No. 89, the velocity, when handling 25,000 gal. per hour of hot fluid (Example 1, Notebook No. 89), is 2.8 ft. per second. Its specific gravity is 0.7 (specific gravities at elevated temperatures can be computed from Notebook No. 88, April 6). The space between tubes is ¼ in.

$$\frac{D}{x} = \frac{18}{9} = 2$$

Using Fig. 1 on the back of this page, the pressure drop is found to be 4.6 psi. This was obtained by reading upward from 2.8 on the bottom scale to the 0.7 specific gravity line for a ¼-in. tube spacing. Reading to the left it is seen that the pressure drop for no baffles is 0.76 psi. The influence of the baffles is obtained by following the sloping lines on the left up to the line for a D/x value of 2 and again reading to the left. This shows a pressure drop of 3.3 psi., but this is for a 10-ft. length of shell and hence:

$$\Delta P = 3.3 \times \frac{14}{10} = 4.6$$

For tubes spaced at ½ rather than ¼ in., the pressure drop would have been 1.58 psi., and for a ⅜-in. spacing, the average of the two values (2.5 psi.) would be used.

Multipass shells.—To use Fig. 1 for multipass shells, the velocity should be multiplied by the number of passes and great care must be used in examining the crossbaffle arrangement to be certain that crossflow occurs across the whole diameter. In many arrangements it is necessary to use a corrected or equivalent value of D. Finally, the length of the exchanger should be multiplied by the number of passes.

Disk and doughnut baffles.—The use of Fig. 1 is modified by computing the velocity differently (see Notebook No. 89) and by using only half of the real value of D/x.

Example 2.—The exchanger of Example 1 is the same except that a longitudinal baffle is used to produce a two-pass exchanger.

$$\text{Vel.} = 2 \times 2.8 = 5.6$$

Using Fig. 1 as in Example 1, the pressure drop for 10 ft. is found to be 14 psi. The length of travel is now double and hence:

$$\Delta P = 2 \times \frac{14}{10} \times 14 = 39 \text{ psi.}$$

Example 3.—The baffles of the exchanger of Example 1 are changed to disk and doughnut type. The velocity will be only 1.65 ft. per second (see Example 4 of Notebook No. 89). Fig. 1 shows a pressure drop of 0.215 psi. for no baffles and a pressure drop of 0.8 psi. for a D/x value of 1 (half of actual D/x). When corrected for the length of 14 ft. the pressure drop is 1.1 psi.

No. 98 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

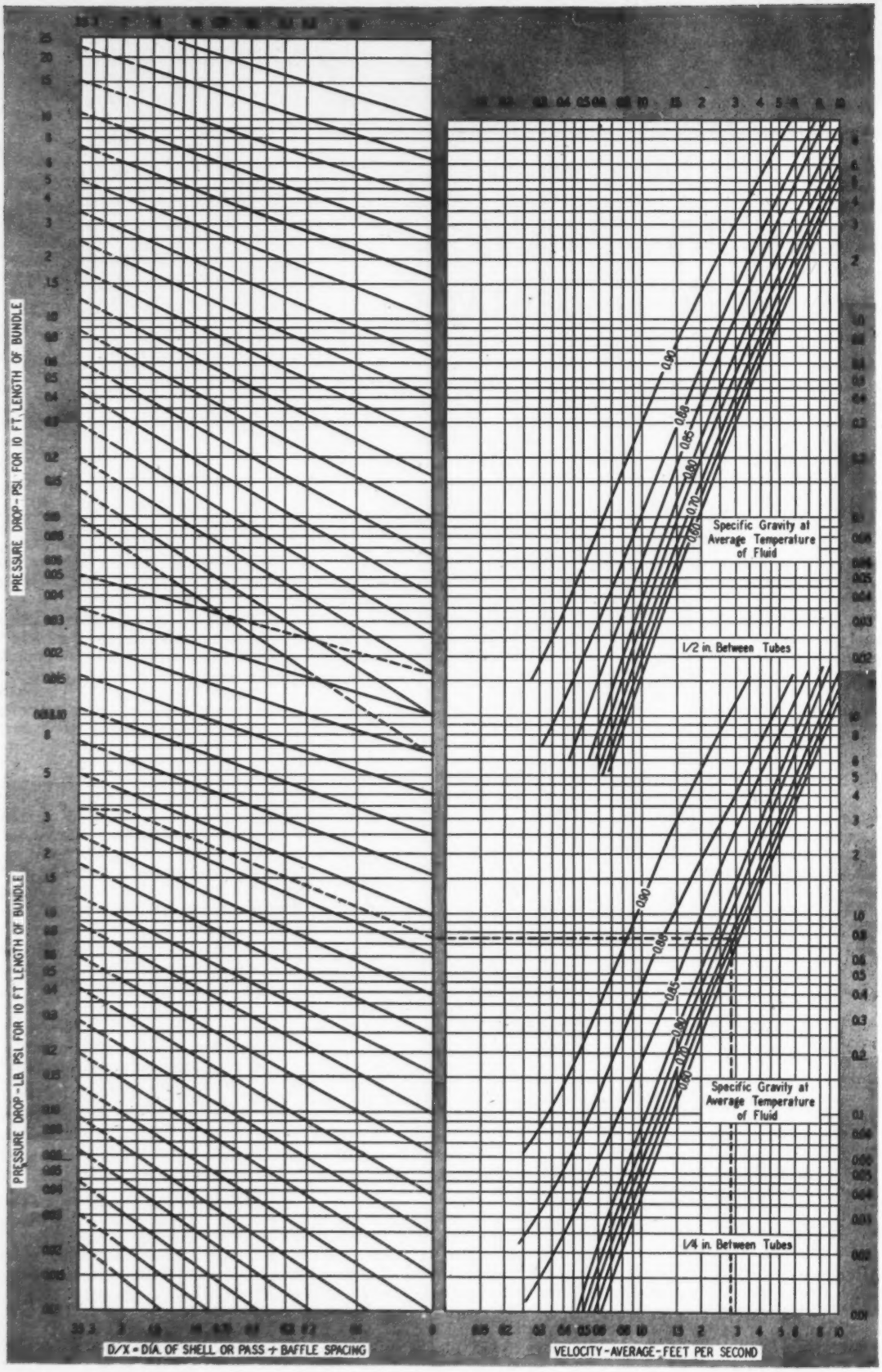
PRESSURE DROP - PSI FOR 10 FT. LENGTH OF BUNDLE
PRESSURE DROP - LB. PSI FOR 10 FT. LENGTH OF BUNDLE
D/X = DIA. OF SHELL OR PASS ÷ BAFFLE SPACING
VELOCITY - AVERAGE - FEET PER SECOND
Specific Gravity at Average Temperature of Fluid
1/2 in. Between Tubes
Specific Gravity at Average Temperature of Fluid
1/4 in. Between Tubes

Fig. 1—Pressure drop through exchanger shells. (1) For petroleum oils only. (2) Length of tube bundle, 10 ft. (3) Single-pass shell. (4) For multipass shells or other cross baffles, see text. (5) Half-moon cross baffles. (6) Staggered-tube arrangement. (7) For velocity, see The Refiner's Notebook, No. 89

Engineering Fundamentals

No. 240

A FEATURE OF THE OIL AND GAS JOURNAL

Methods for Determining Differences in Elevation

THE process of determining the difference in elevation between two points on the surface of the earth requires that the vertical distance be measured between a pair of level surfaces passing through the two points. A level surface is a curved surface every point of which is perpendicular to the direction of the force of gravity at that particular point (Fig. 1). A level surface at mean sea level is usually said to have an elevation of zero. Any level surface with an assumed elevation of zero is known as a datum plane. A horizontal line is one which is tangent to a level surface at only one point. Since an infinite number of lines can be drawn tangent to a spherical surface it follows that the horizontal line in Fig. 1 represents the trace of a horizontal plane. In plane surveying where relatively small areas are considered, the length of the usual sight in leveling is so short that little difference exists between a horizontal line and a level line. In a distance of 1,000 ft. a horizontal line will depart from a level line by slightly more than 0.02 ft., a difference that is commonly neglected. The usual field procedure tends to eliminate almost entirely the errors caused by the curvature of the earth.

Equipment for Running Ordinary Levels

Differences in elevation are usually determined by running ordinary differential levels. The necessary equipment is an engineer's level, a level rod, and a turning point. The level may be either the wye or dumpy type, and the rod either an open or a closed-face type. For convenience the rods should be of the extension type. Such rods will read up to 6 or 7 ft. as short rods, and up to 12 or 13 ft. when fully extended. The rod need not be equipped with a target since most rods are used as self-reading rods, i.e., they are read directly by the instrument man, commonly to the nearest 0.01 ft. For sights of usual length the readings taken fall within this degree of accuracy without the aid of a target. The latter are used only on extremely long sights and for rod readings taken through dense foliage where it is difficult to distinguish the foot marks.

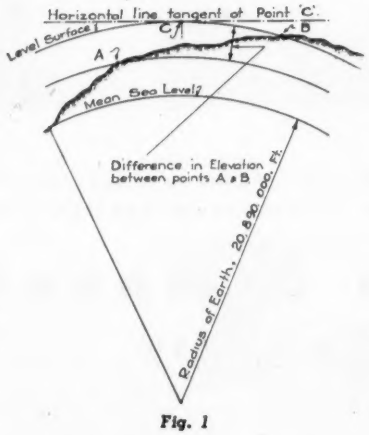

Fig. 1

A turning point is anything from a sharpened stake to a pointed, iron bar driven firmly into the ground. Purpose of a turning point is to furnish a surface upon which to set a level rod as a series of levels is run from one bench mark to another. Throughout its period of use it must remain stationary. This period usually lasts only from the time a foresight reading is taken until a backsight reading is completed.

Sometimes a turning point is made by fastening a hemispherical metal piece about 1 in. in diameter to a triangular plate about 4 in. on a side. Into this are screwed three sharp prongs each about 1 in. long. Such a device (Fig. 2) can be set on fairly plane surfaces and the hemispherical top assures that the rod will always be set on the same spot.

Use of Transit for Leveling

A transit can be used to run levels with as accurate results as a level providing the radius of curvature of the bubble tube is fairly long, say 60 ft. or more. More surveyors should realize this and the transit should be used more as a leveling instrument. When used as a level the plate bubbles are brought quickly to the center of their tubes. The telescope is clamped in nearly a horizontal position, then the telescope bubble tube is centered by means of the tangent screw that controls the vertical motion of the transit. In using a transit equipped with stadia wires, caution must be exercised to make certain that the middle horizontal wire is used when the rod reading is taken.

Rough differences in elevation can be determined with a clinometer when the slope lengths of lines are known. A clinometer is a device for measuring roughly the vertical angle of inclination or depression (see Fig. 4). The data recorded in the field are "s" and "α." The difference in elevation, "h," between the point occupied and the point sighted is equal to the slope distance, "s," times the sine of the vertical angle, "α," or $h = s \times \sin \alpha$.

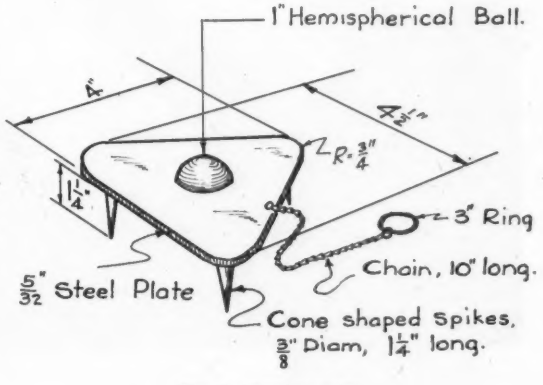

Fig. 2—Turning point

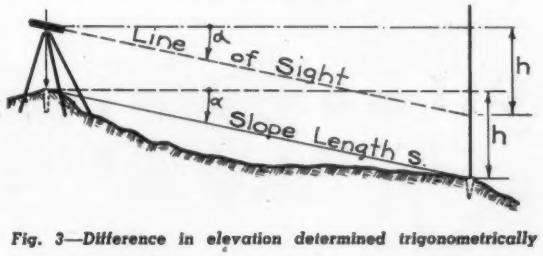

Fig. 3—Difference in elevation determined trigonometrically

Series prepared by Dr. E. A. Stephenson, head of petroleum engineering school, and Prof. D. Don Haines, department of civil engineering, University of Kansas

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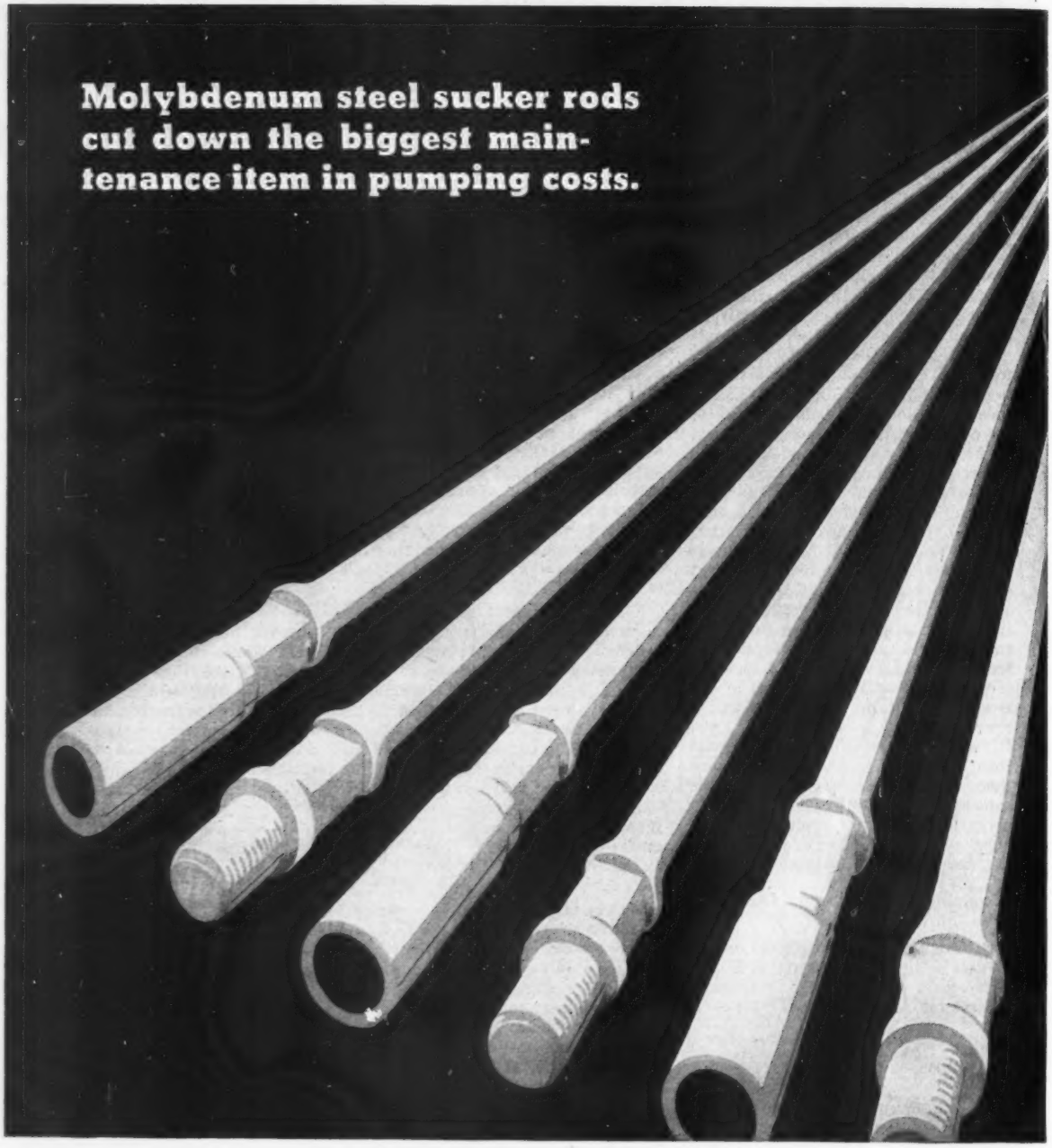

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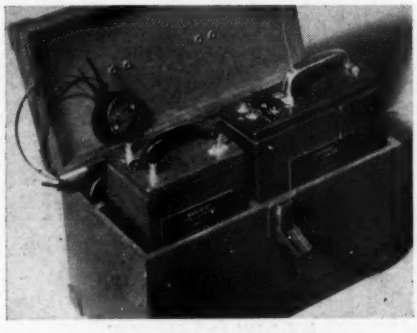
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Kenneth B. Barnes

(1) MODEL 112 PIPE LOCATOR consists of a transmitter unit and a receiver unit. Transmitter supplies a test signal to the pipe. Receiver unit has an internal pickup coil and three-stage amplifier. The pipe is traced by the



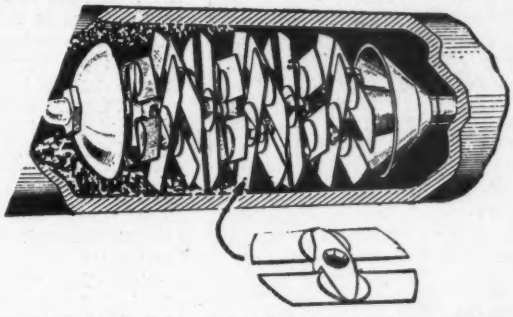
signal picked up in its vicinity. Can be used when two points on the pipe are available, when one point is available, when no part of the pipe is available, when pipe is well coated, and in tracing long lines under water. *Nilsson Electrical Laboratory, Inc.*

IT'S NEW CHECK IT

(2) NEW AUTOMATIC HEATER for liquids, of the electric safety-immersion type, combines in one self-contained unit, an ideal installation for industrial water tanks, drums, processing kettles, stills, etc. Builtin safety control limits temperature rise should the liquid level fall and expose the heating element to air. Can be set as desired from room temperature to 350° F. Will maintain the temperature of liquids within ±5° F. Pilot light indicates when heater is functioning. Available with copper or steel sheaths, in wattage ratings of 250, 500, 750, and 1,000. *American Instrument Co.*

IT'S NEW CHECK IT

(3) THOR FLUE SHAVER quickly and effectively gets rid of hard carbon and scale. Scrapes down to the bare metal. Betters heat exchange by removing the inert and



unwanted deadening material which increases fuel consumption. Has 11 blade units of Swedish spring steel, each with four cutting edges. Reinforced. *Goedert Flue Shaver Co.*

IT'S NEW CHECK IT

(4) PULSATION DAMPER is for any pressure installation where readable indications and charts are required, as pressure controllers, orifice meter U-tubes, draft gages, and other pressure-operated devices. Control of surging pressures is by engagement of two taper threads. The stem is threaded with one type while the threads of the damper body are slightly dissimilar. During engagement these two dissimilar threads produce a small orifice around the thread lips. Simply by turning the damper stem inward or outward for pressure adjustment the

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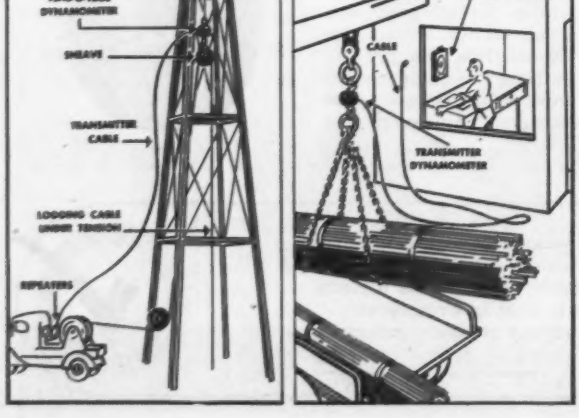
spiral orifices between the threads are diminished or enlarged. *Martin-Decker Corp.*

IT'S NEW CHECK IT

(5) HYDRAULIC PARAFFIN CONTROL for pumping wells consists of a lift to make use of the hydraulic power on the lease to raise and lower a series of scrapers positioned in the production tubing. Controlled by two valves at the base of the lift. When the bottom valve is open and the other closed, the power oil flows through the bottom of the lift, forcing the piston, attached to the top of the power-oil tubing, upward in the lift. This moves the scrapers on the power-oil tubing through the paraffin zone, loosening the wax, which can then be easily pumped from the well. *Kobe, Inc.*

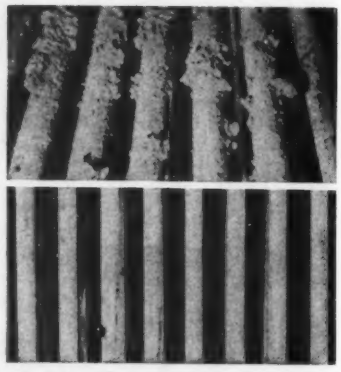
IT'S NEW CHECK IT

(6) TENS-O-TROL is a new remote indicating dynamometer, or tension-and-weight measuring instrument, with wide application possibilities. Pictured are two of many uses. In oil-well logging the cable passes over a crown sheave suspended from the master transmitter; the transmitter cable runs to repeater station at the winch operator's position. Indicates the exact weight of the cable as it is released into the well. In crane installations and with booms, operator can read exact weight as it is lifted. Excellent for all mechanical assemblies where loads must be measured and read at a distance. *W. C. Dillon & Co., Inc.*



IT'S NEW CHECK IT

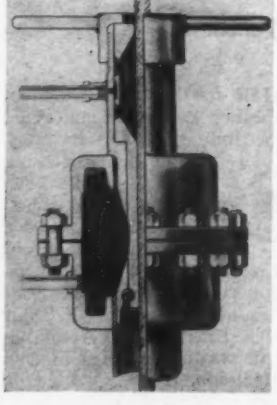
(7) GAMLENITE CHEMICAL COMPOUND removes hard slags and other combustion deposits from tubes and boiler metal surfaces, from furnace refractory walls, etc. It is a powder which is blown into the furnace while it is in regular operation. Forms a dense nonpoisonous vapor which reaches all parts of the furnace and firesides of the boiler metal. Minimizes necessity for taking the boiler off the line to do the cleaning job manually. Breaks down hard combustion deposit into a soft powder by reducing action. *Gamlen Chemical Co.*



Upper: Typical hard combustion deposit on boiler tube section. Lower: Section after application of Gamlenite

IT'S NEW CHECK IT

(8) NEW WIRE-LINE STRIPPER employs a different principle in line stripping. Has a wiper rubber confined within steel housing; when acted upon by an outside source, the rubber contracts, closing around the line. Source of pressure may be CO_2 gas, field gas, nitrogen, etc. Maintains a constant contact between the rubber and wire line at all times. Proved in actual field operations, the stripper has been used on swabbing jobs, bailing, wire-line coring and well surveying. Expenses saved on cleanup jobs can pay for the entire cost of the equipment, plus obtaining the increased safety factor during operation. *Regan Forge & Engineering Co.*

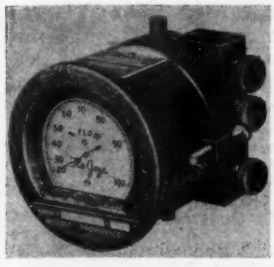


IT'S NEW CHECK IT

(9) NEW FIRE-CONTROL NOZZLE for fixed installations, constructed in such a manner that it produces a fog, is particularly adapted to the protection of tanks containing flammable liquids, either in tank farms or housed in buildings. Fog is produced by forcing water through three clear spiral passages and a central passage in the head of the nozzle and is maintained even at greatly reduced water pressures. Can be used in systems that are con-

trolled either manually or automatically. *Blaw-Knox Sprinkler Div. of Pittsburgh.*

IT'S NEW CHECK IT



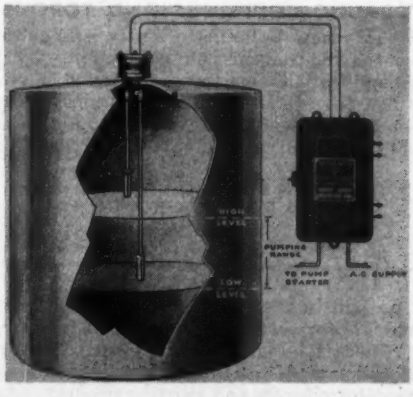
(10) NEW "FLO-GAGE" indicates rate of flow of liquids and gases through lines containing orifice, venturi tubes, and insert nozzles as differential producers and also indicates liquid level and pressure differences. Particularly useful as an operating guide in manually adjusting valve positions at the start of a cycle of operations as well as in providing continuous information on flow rates throughout the complete cycle. Requires no mercury or auxiliary power. *Builders-Providence, Inc.*

IT'S NEW CHECK IT

(11) PORTABLE DRINKING FOUNTAIN, fitted with a salt dispenser, provides fresh water for gangs working outside plants and in the field. Has a built-in, corrosion-proof bubbler of the tilting type, and a pump for the necessary pressure. Equipped with loops for carrying straps. Does away with drinking cups and seals the water from contamination by dust and dirt. *Dobbins Manufacturing Co.*

IT'S NEW CHECK IT

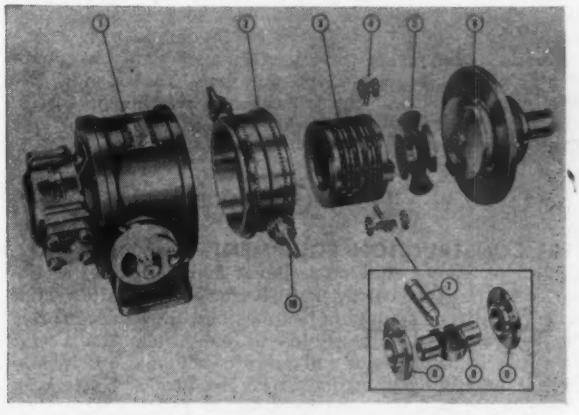
(12) PHOTOSWITCH LEVEL CONTROL UNIT is for the level control of all electrically conductive liquids. Contact with the liquid is made only by a stainless steel probe



rod (no floats, bellows seals, or stuffing boxes). The liquid to be controlled makes or breaks contact with the probe and transmits to the control a minute electrical current at low voltage. This current controls a power circuit which operates a relay to actuate signals, valves, or pumps. *Photoswitch, Inc.*

IT'S NEW CHECK IT

(13) HYDRAULIC PUMP develops 5,000 psi. and 40 hp., delivers 0 to 17 g.p.m. at 1,200 r.p.m. Generates the desired tonnage for hydraulic operations without large cylinder assemblies and provides single source of high



Exploded view of variable delivery superdraulic pump

1. *Pump-housing subassembly*
2. *Elliptical reaction rings*
3. *Double bank rotor*
4. *Plunger movement assembly*
5. *Coupling disk*
6. *Drive-housing subassembly*
7. *Plunger*
8. *Rollers*
9. *Axle*
10. *Volume-control pinion*

pressure and high volume, eliminating double pump arrangements. Eliminates intensifiers and accumulators up to 5,000 psi. *Hydraulic Machinery, Inc.*

IT'S NEW CHECK IT

(14) NEW FIRE BLANKET fabricated of flame-resistant, neoprene-impregnated, asbestos cloth, may be hung anywhere—indoors or out—without a cabinet or container. Readily accessible and highly visible (red color), the blanket also features exceptional durability and strength. Measures 60 by 80 in. and is equipped with ¾-in. grommets for hanging on a simple bracket in any part of the plant where flammable materials are apt to endanger life or property. Easily cleaned with soap and water. Used for smothering fires in buckets, or small containers, and for covering vents, manholes or other openings from which flame is issuing, also as an effective welding screen. *Benson & Associates.*

IT'S NEW CHECK IT

(15) DRUM HEATER for liquefying solids and greases furnished in steel drums, melts its way down into the drum and can be stopped at any height. Thermostatic control protects against overheating and keeps material above the heater at desired temperature. Rated at 230 volts, 5,000 watts, it is also available in special ratings for specific requirements. *Edwin L. Wiegand Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(16) "AIR FOAM." This booklet describes the newer mechanical or air foam for fire fighting which, unlike the foam in use for years, is formed without chemical reaction. The booklet tells how air foam is produced either by portable playpipes or stationary foam makers. A pictorial record of the largest test fire on record, a 93-ft. diameter oil tank, which was extinguished in 4 minutes is also shown. *Pyrene Manufacturing Co.*

IT'S NEW ✓ CHECK IT

(17) SPRAY ENGINEERING. Designed as an engineering guide to a selection of spray nozzles for any purpose, new 32-page catalog now available to those interested in spraying equipment. Describes in detail spray characteristics, dimensions and performance data on standard as well as special purpose nozzles. Tables show capacity in g.p.m. and spray angles at various pressures. Useful engineering data is included. *Spraying Systems Co.*

IT'S NEW ✓ CHECK IT

(18) CONSTRUCTION EQUIPMENT. New multicolored catalog of tractor equipment shows applications of accessories to the standard track-type tractor. Well illustrated with pictures of actual applications and shows accessories for converting tractors into draglines, clamshells and cranes. Various types of winches are included. Also available is new bulletin on industrial lift trucks. *Hyster Co.*

IT'S NEW ✓ CHECK IT

(19) PLASTIC COATING. A solution of corrosion contamination problems is offered by this manufacturer. Can be applied by pressure spray to all surfaces, including concrete, steel, and wood. This new bulletin covers properties and applications in detail. *Nukem Products Corp.*

IT'S NEW ✓ CHECK IT

(20) HIGH-TENSION STEEL. Otiscoloy is the subject matter of 16-page 2-color, illustrated booklet explaining reduced structural weight, excellent weldability, corrosion and abrasion resistance of new high tensile, low alloy steel. Also gives technical information and suggested applications. *Jones & Laughlin Steel Corp.*

IT'S NEW ✓ CHECK IT

(21) CHEMICAL TREATMENT FOR DRILLING MUD. A pocket-sized 56-page booklet, offers a ready reference digest on mud properties, testing methods, practices for safe, fast well drilling with rotary tools; surface systems for mud handling, control methods relating to viscosity, water loss, etc. Also contains description of chemical compounds that are used effectively in maintaining necessary controls. *American Cyanamid & Chemical Corp.*

IT'S NEW ✓ CHECK IT

(22) WIRE-LINE MAINTENANCE AND SELECTION. New 56-page highly illustrated booklet filled with constructive information on the selection and maintenance of wire lines for the oil country. Covers types of lubrication, checks and inspection of lines, coatings, spooling, rotary drilling, prevention of wear and miscellaneous data. *American Cable Division, American Chain & Cable, Inc.*

IT'S NEW ✓ CHECK IT

(23) NEW LIGHT AIRPLANE. Catalog giving features and specifications of the new Funk F-2-B light plane, with cruising speed of 100 m.p.h. and cruising range between 350 and 400 miles. *Funk Aircraft Co.*

IT'S NEW ✓ CHECK IT

(24) HEAT EXCHANGERS AND CONDENSERS. A 42-page, multicolor catalog is complete with factual data on standard line of stainless-steel heat exchangers and condensers. Definitions of the various units, sketches of their application and construction, and complete specifications of each type and size are given. Physical properties for miscellaneous compounds and several temperature, thermal, and calculation charts and tables are included. *The Pfaudler Co.*

IT'S NEW ✓ CHECK IT

(25) HYDRAULIC FLOW REGULATOR holds constant rate of flow of fluids at any predetermined amount, regardless of variations in applied pressure or resistance; available in ½ to ¾-in. pipe sizes. This new pamphlet covers the construction and uses of the regulator. *Waterman Engineering Co.*

IT'S NEW ✓ CHECK IT

(26) NEW PUMP CATALOG lists pumps for handling difficult material in transferring, metering or proportioning, in ranges from 500 to 4,000 g.p.m. Well illustrated with exploded photographs and capacity charts. *Marco Co., Inc.*

IT'S NEW ✓ CHECK IT

(27) HYDRAULIC COUPLINGS AND TORQUE CONVERTERS. Two new bulletins recently issued by manufacturer of power-transmission equipment describe the uses and applications of these improved methods of transmitting power. Design, calculations, installation drawings and specifications for both couplings and converters are covered in great detail. *Twin Disc Clutch Co.*

IT'S NEW ✓ CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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REFINING

WAA Recommends Sale of 10 Rubber Plants

WASHINGTON. — War Assets Administration last week told Congress that 10 synthetic rubber plants, representing $182,000,000 of the Government's $716,000,000 investment in the industry, should be sold to private operators.

The list included the country's only two butyl plants, both Government-owned and operated by oil companies. None of the 10 petroleum butadiene plants, however, were among those which WAA recommended be sold.

The five styrene plants and one neoprene plant recommended for sale are all of this type owned by the Government. WAA said they represent 90 per cent of the styrene capacity and 86 per cent of the neoprene capacity of the country.

WAA's recommendations were submitted in compliance with the Surplus Property Act which requires the administration to present to Congress disposal plans for facilities costing $5,000,000 or more. The recommendations were the first presented to Congress for the sale of any of the war-built emergency rubber installations.

WAA recommended that the 10 plants be sold immediately and that preliminary negotiations be carried on with interested purchasers or lessees after which a final date for submission of bids be announced. The Office of Rubber Reserve will be asked to advise or assist prospective purchasers or lessees in acquiring patent rights.

The disposal agency said efforts will be made first to sell the plants. But in case offers are inacceptable, leases will be considered. Where necessary, it added, the government-owning agencies will "prescribe conditions for disposal to insure an adequate supply of synthetic" while natural rubber remains scarce.

The disposal recommendations follow out generally the proposals made in March by a government Interagency Policy Committee on Rubber after a lengthy study of the synthetic rubber question.

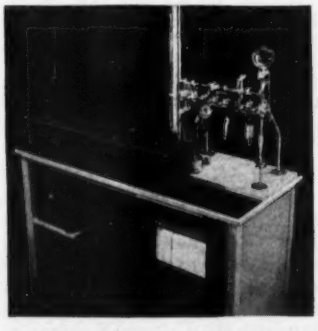
In its recommendations to Congress last week, WAA suggested sale of the following:

Plant and operator—	Investment	Rated capacity tons annually
Butyl plants:		
Baton Rouge, La., Standard Oil Co. of New Jersey	$25,882,000	38,000
Baytown, Tex., Humble Oil & Ref. Co.	25,937,000	30,000
Louisville, Ky., E. I. du Pont de Nemours & Co.	38,415,000	60,000
Styrene plants:		
Institute, W. Va., Carbide & Carbon Chemical Co.	9,837,000	25,000
Los Angeles, Dow Chemical Co.	12,558,000	25,000
Velasco, Tex., Dow Chemical Co.	17,759,000	50,000
Kobuta, Pa., Koppers Co., Inc.	18,832,000	37,500
Texas City, Tex., Monsanto Chemical Co.	18,291,000	50,000
Furfural plant:		
Memphis, Q. O. Chemical Co.	5,031,000	12,000
Carbon Black plant:		
Odessa, Tex., United Carbon Co.	9,500,000	(*)

*41,000,000 lb. per year.

The Government owns 44 plants connected with the synthetic rubber program, including carbon black in-

BECKMAN IR-2 INFRARED SPECTROPHOTOMETERS



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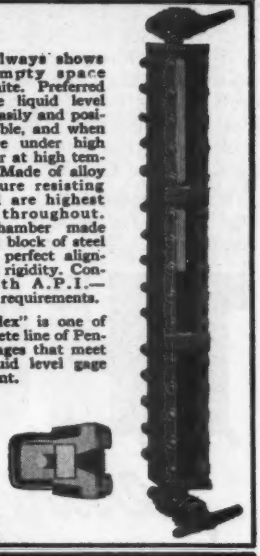

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stallations. The largest single part of its investment is the $215,171,000 total in the petroleum butadiene plants. Eight of the 10 chemical and carbon black plants included in the program cost less than $5,000,000. The other two were among those recommended for sale.

The report of the Interagency Policy Committee on Rubber said the synthetic facilities should be disposed of so as to continue production of about one-third of the nation's total rubber needs. All efficient plants, it said, should be operated by the Government for another 2 years until natural rubber becomes available.

The committee asserted there is no justification for maintaining any of the alcohol butadiene plants, even with a subsidy to utilize surplus grains or farm wastes. The Government owns three such plants, built at a cost of $115,438,000.

Gulf Coast Plants Report Increase in Crude Runs

HOUSTON.—Operations of plants in the Gulf Coast Refiners Association rose from 60.6 per cent to 70.4 per cent of capacity during the last half of May, according to the association's semimonthly report.

During the last half of May, crude runs to stills totaled 111,285 bbl. daily of the 158,000 bbl. daily operating capacity. Runs during the first half of the month were 95,778 bbl. daily.

The association reported total stocks of all products in member plants were 3,621,279 bbl. June 1—up 286,495 bbl. from May 15. Automotive gasoline stocks during the last half of May increased 149,428 bbl. to a total of 1,249,919 bbl. Aviation gasoline stocks dropped 5,965 bbl. to 329,266 bbl.

Kerosene inventories rose 81,061 bbl. during the period to a total of 300,354 bbl. June 1. Diesel gas oil stocks were 200,864 bbl., reflecting an increase of 75,968 bbl. Stocks of No. 5 fuel oil decreased 14,474 bbl. to 27,085 bbl., and Bunker C fuel oil decreased 121,183 bbl. to 401,620 bbl.

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Oil Refining Industry Shows Highest Sales

PHILADELPHIA.—The oil refining industry during 1944, comprising 36 companies, reported the largest net sales of any industry group and exceeded its 1943 total, according to the Securities Exchange Commission. Total sales in 1944 were $7,827,909,000, against $6,434,649,000 for 37 companies in 1943, an increase of 21.7 per cent.

Net profits for refiners, before income taxes, amounted to $986,623,000 in 1944, or 12.6 per cent of sales. Comparable figure for 1943 was $845,505,000, or 13.1 per cent of sales. Net profits, after income taxes, were $640,753,000, or 8.2 per cent of sales in 1944, compared with $504,946,000, or 7.8 per cent of sales in 1943.

Ohio Standard Renews Chemistry Fellowships

CLEVELAND, Ohio.—Standard Oil Co. of Ohio has granted two graduate fellowships in organic chemistry to Western Reserve University representing a total expenditure of $2,800, Winfred G. Leutner, president of the university, announced last week.

Standard Oil Co. of Ohio has provided fellowships in chemistry in Western Reserve University since 1936. During the war it became necessary to suspend them owing to the shortage of available candidates.

U. S. Reports Available

WASHINGTON.—The Department of Commerce's publication board has made available reports on the following subjects: Sectionalized plywood barge for transporting petroleum products; liquid soap from napalm; water-cooled gas turbine rotor; multiple-pressure indicator gage; German methods for the production of wax; and esters synthesized in Germany for cold weather lubricants.

PIPE LINES

New Crude Line to Tap Hamilton Dome Field

DENVER.—Hamilton Pipe Line Co. is now completing a 24-mile 8-in. crude line extending into Hamilton Dome field, Hot Springs County, Wyoming, where Standard Oil Co. (Indiana) has contracted with Argo Oil Corp. for the purchase of its production.

Hamilton Pipe Line is controlled by B. M. Bumford and Stanley G. Gray, of Comet Refining Co., Minneapolis. Local refineries will continue to be supplied by tank trucks which heretofore have moved all oil from the field. The new line will join the Elk Basin-Casper line.

Hamilton Dome field was discovered in 1918 and has an estimated capacity of 4,000 bbl. daily. With the Indiana Standard-Argo arrangement completed, shut-in wells will be placed on production, and the field developed by drilling additional wells and deepening some of the Embar producers to the Tensleep sand. At the beginning of this year, 35 pumping wells in the fields were making 1,525 bbl. daily. The 30 per cent of the field's production owned by the Curtis interests will be included in the Indiana Standard purchases.

Panhandle Eastern's Improvements Authorized

WASHINGTON. — The Federal Power Commission last week gave its approval to $6,216,000 in construction work proposed by Panhandle Eastern Pipe Line Co. as the 1946 phase of its 2-year expansion program.

Included in the work authorized by the federal agency is 50 miles of 18-in. trunk line from the vicinity of Shamrock Oil & Gas Co.'s natural gas processing plant in Moore County, Texas to Hansford station, Hansford County, Texas, and 24 miles of 26-in. loop extending from the outlet side of Tuscola station in Douglas County, Illinois.

In addition, Panhandle Eastern also will build a field compressor station of 3,000 hp. capacity near Sunray, Moore County, Texas. The station will include a dehydration plant. Additional compressor units of 800 hp. are to be installed in existing stations, three at Hansford station, two at Hugoton station in Stevens County, Kansas, and one at Olpe station in Lyon County, Kansas. The company also will install two 1,600 hp. compressor units in Glenarm station, Sangamon County, Illinois; Tuscola station; Zionsville station in Marion County, Indiana, and Edgerton station in Allen County, Indiana.

The additions to the Panhandle Eastern system are designed to boost its capacity by about 10,000,000 cu. ft. daily. A temporary authorization covering part of the proposed alterations was issued by the commission in April. Panhandle Eastern asked in its application that FPC grant permission in time to allow completion of the work before the period of heavy gas demand next winter.

The company's entire 2-year program contemplates an expenditure of $27,313,000 on its transmission system from Texas to Michigan. According to the original application, Panhandle Eastern will be able to deliver an additional 90,000,000 cu. ft. daily to its eastern markets on completion of the entire program.

Wasson Field Producers Prorated on Pipe Line

MIDLAND, Tex.—West Texas had its first pipe line proration last week as a result of the record-high June oil allowable.

Shell Oil Co., Inc., told producers it could run only 87 per cent of the scheduled allowable in Wasson pool, Yoakum County. The company said that June scheduled allowable exceeded its nominations by 14,345 bbl. daily, of which 12,310 bbl. daily is in Wasson pool.

Ways have been found, it added, to handle approximately 10,000 bbl. daily

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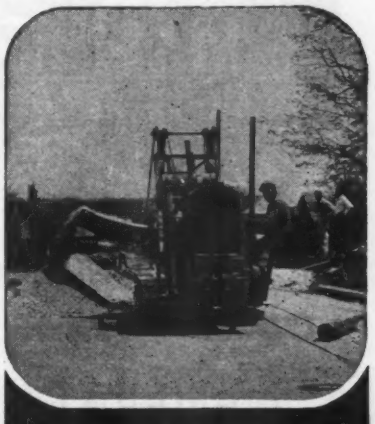

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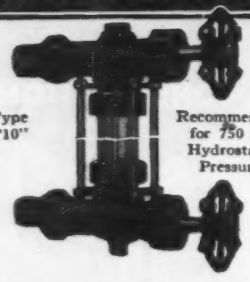

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous: stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

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of the excess, but not for the 4,300 bbl. "Under the circumstances, the company has been reluctantly forced to limit receipts in the Wasson field to 87 per cent of the scheduled allowable for June," Shell's announcement said.

El Paso Natural Gas Co. Stockholders to Meet

NEW YORK.—A special meeting of stockholders of El Paso Natural Gas Co. has been called by the directors for June 27 in Wilmington, Del., to consider plans for financing the company's projected Texas-California gas pipe line.

El Paso's 24-in. and 26-in. line will extend from Dumas, Texas, to a point on the Arizona-California line near Blythe, Calif., where it will connect with a 30-in. line to be built to Santa Fe Springs, Calif., by Southern California Gas Co. and Southern Counties Gas Co. The entire project was approved earlier this month by the Federal Power Commission. An account of the commission's decision appeared on page 76 of The Oil & Gas Journal's June 15 issue.

According to the FPC record, El Paso will finance its line by bonds, a bank loan and the sale of stock. The bond purchase contracts provide for the sale by El Paso to six insurance companies of $36,000,000 of 3 per cent 20-year first mortgage bonds. El Paso has made an agreement with the Chase National Bank for a loan of $8,500,000 at 2 per cent interest and has a contract with underwriters for the sale of $7,500,000 of preferred stock at a dividend rate of 4 to 4½ per cent and for the sale of $4,000,000 of common stock to present holders at $40 a share. This, FPC said, will provide El Paso with $56,000,000 to meet construction costs and to refinance and allow for a $2,000,000 contingencies fund.

Motor Fuel Shipments Increase in March

Pipe line carriers of motor fuel transported 16,128,000 bbl. during March, up 23.4 per cent over February's total of 13,066,000 bbl., according to the Bureau of Mines' monthly report. One year ago, motor fuel delivered from lines during March amounted to 27,153,000 bbl. Decreased war shipments of motor fuel reduced the total amount carried by pipe lines in the period of January through March, from 77,095,000 bbl. in 1945 to 44,787,000 bbl. for the same period this year, a decline of 32,308,000 bbl., or 41.9 per cent.

Stocks in pipe lines and working tanks showed little change at the end of March, with a total of 10,130,000 bbl. reported, compared with 10,038,000 bbl. at the end of February. Comparable stocks for March 1945, were 13,466,000 bbl.

Humble Replacing Crude Line in West Texas

MIDLAND, Tex. — Humble Pipe Line Co. is replacing 9½ miles of 6-in. crude line with 8-in. line between North Cowden station and Emma pool, Andrews County, West Texas.

The company also is extending its system to Three Bar pool. Other pipeline activity in the West Texas area includes the connection made by Magnolia Pipe Line Co. to Superior Oil Co.'s new discovery south of Fullerton pool in Andrews County, and operation of Richardson Pipe Line Co.'s system between Wasson and Slaughter pools by Atlantic Pipe Line Co. Richardson is continuing to operate the gathering system.

Kansas Runs Hit Peak

TOPEKA, Kans. — Daily average pipe line runs of Kansas crude stood at their highest point of the year in the week ended June 10. The conservation division of the Corporation Commission reported runs averaged 282,932 bbl.—43,461 bbl. daily above the average during the previous week.

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Natural Gas

New Michigan Company to Operate Gas Storage

SAGINAW, Mich.—Michigan Natural Gas Storage Co., organized to operate one of the world's biggest natural-gas storage systems, has named James A. Brown, New York, as president.

The company is the outgrowth of a contract between Consumers Power Co. of Michigan and Panhandle Eastern Pipe Line Co. to run for 25 years to assure 240 Michigan communities of adequate facilities. The company will construct a 150-mile, 24-in. pipe line next year from Chelsea, Mich., to the underground storage area in Clare, Missaukee, and Osceola counties.

Other officers are: D. E. Herringshaw, Jackson, vice president and A. J. Mayotte, Jackson, secretary-treasurer. Directors are the officers, Edward Buddrus, Chicago, D. E. Karns, Jackson, and William G. Maguire and J. R. Whiting, New York.

Reynosa Pipe Line Wins Permit to Export Gas

WASHINGTON.—The controversial Reynosa Pipe Line Co. case was decided in favor of the company by the Federal Power Commission last week.

The case involves Reynosa's application to transport gas to the border for export into Mexico. The commission in its ruling authorized the company to sell up to 50,000,000 cu. ft. daily to Gas Industrial de Monterery, S. A.

Opposition to the application was registered by Olin Culberson, chairman of the Texas Railroad Commission, at a second hearing on the application here early in April. Culberson contended Mexico has vast gas reserves of its own in the northern part of the country.

In another gas export case, the commission last week authorized United Gas Pipe Line Co. to continue export under a revised contract with Compania Mexicana de Gas, S. A. United had sought permission to continue shipments at an increased rate of 5 cents per 1,000 cu. ft. The commission's order limited deliveries by United to 31,275,000 cu. ft. daily, the present capacity of Compania Mexicana's pipe line.

The export authorization to Reynosa will involve construction of about 30 miles of pipe line from gas fields in Hidalgo County, Texas, to the border. Gas Industrial de Monterrey will purchase the gas at the border under a 10-year contract and transport it to Monterrey for use by a limited number of industrial companies who are subscribers to its stock.

Wider Diesel Use at Expense of Gas Seen

MILWAUKEE.—A trend toward "higher" uses for natural gas which will bring about more widespread use of diesel power in the oil industry was predicted here at a recent meeting of the oil and gas power division of the American Society of Mechanical Engineers.

The speaker was A. W. McKinney, vice president of National Supply Co. "In years past," he said, "there has been an abundance of cheap gas fuel available for gas engines and steam boilers in practically all oil fields. Then it was more economical for the operator to use a source of power utilizing what was considered the cheapest fuel.

"Now it is being learned that the natural gas is not so cheap as has been believed. New uses found for natural gas have increased its value to a point where diesel fuel can offer it stiff competition." Improvements in the design of diesels, coupled with such considerations as those involved in off-shore drilling, point to a substantial increase in diesel use in the industry, McKinney said.

Conservation Emphasized At Canadian Meeting

WINDSOR, Ont.—At the twentieth annual convention of the Natural Gas and Petroleum Association of Canada held here recently, speakers stressed conservation of existing natural-gas reserves and the utilization of auxiliary gas supplies.

George H. Smith, director of the Natural Gas Department of the American Gas Association, spoke on the program of his organization. "Underground Storage of Gas" was discussed by Gary Skeels, assistant to the vice president, Dominion Natural Gas Co., and C. George Segeler, A. G. A. engineer, read a paper on "Peak Load Auxiliary Gas," dealing with methods of handling propane.

Officers elected for the ensuing year included Charles E. Steele, Port Colborne, president emeritus; Major E. Sweet, Brantford, honorary president; S. A. Morse, Chatham, president; S. B. Severson, Buffalo, first vice president; C. N. Glenny, Fort Erie, second vice president; Joseph McKee, Hamilton, secretary; and J. A. Richie, Buffalo, treasurer.

Natural Gasoline

Denver Group Buys Plant; To Add LPG Production

DENVER.—Mountain States Oil Corp.'s natural gasoline absorption plant near Trinidad, Colo., has been purchased by a group of Denver industrialists who plan to enlarge it for the production of liquefied petroleum gases.

The group buying the plant is headed by William J. Cannon. The Mountain States plant was built in 1927 to produce natural gasoline from nearby Garcia field. Enlargement of the plant will be undertaken as soon as materials are available.

Garcia gas field is the second oldest producing field in Colorado. Its first gasser was drilled in 1892, preceded only by Florence field. Dry gas remaining after processing for natural gasoline and liquefied petroleum gases is marketed in the Trinidad area as domestic and industrial fuel.

Cycling Plant Studied For Brazoria County Field

HOUSTON.—McCarthy Oil & Gas Corp. is reported planning construction of a $10,000,000 cycling plant which would have a capacity to process 300,000,000 to 400,000,000 cu. ft. of natural gas daily from Blue Lake pool of Brazoria County, south of Houston.

The McCarthy corporation is the discoverer of the pool. Construction of the plant would provide fuel for a number of industries in the area, including Dow Chemical Co.

Plans for the processing plant depend on unitization of the acreage and also on cooperation of Brazoria County officials in building all-weather access roads to the field. The company is reported seeking cooperation of leaseholders in obtaining 320-acre spacing in view of the high cost of drilling in the pool.

The pool's 11,000-ft. wells are said to cost approximately $350,000. It was in the Blue Lake field where late in April a newly completed McCarthy well indicated 8,225 psi. pressure, highest ever encountered.

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NO GAUGING OR SELECTIVE FITTING REQUIRED

Reed **ROLLER BIT COMPANY**

HOUSTON 1, TEXAS

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 15, 1946

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	31	15	0	†16	43,251	714	587	0	0	0	0	0	0	0	0	0	0
Pennsylvania	76	41	2	‡33	112,306	1,828	1,717	0	0	0	0	0	0	0	0	0	0
West Virginia	19	3	16	0	38,118	317	362	0	0	0	0	0	0	0	0	0	0
Ohio	22	8	9	5	56,212	514	387	0	0	0	0	0	2	0	10	17	29
Indiana	14	8	0	6	25,898	144	75	1	0	0	0	1	2	0	0	8	10
Kentucky	11	7	3	1	18,977	206	192	0	0	0	0	0	2	0	0	15	17
Illinois	51	35	0	16	133,583	938	728	3	0	0	5	8	20	0	0	158	178
Michigan	19	1	3	15	46,346	346	342	1	0	1	7	9	10	0	5	109	124
Kansas	34	19	8	7	101,411	891	724	1	0	0	3	4	14	0	0	108	122
Neb., Mo., Iowa	1	0	0	1	713	9	12	0	0	0	1	1	0	0	0	5	5
Oklahoma	58	36	8	14	204,724	1,059	1,097	2	0	3	7	12	32	0	19	127	178
Texas	139	78	13	48	631,371	3,636	3,261	0	0	2	31	33	87	17	12	577	693
North Central	39	19	1	*19	99,217	1,286	950	0	0	0	8	8	24	0	0	229	253
West	31	24	1	6	148,091	758	864	0	0	0	4	4	23	0	1	80	104
Panhandle	4	2	1	1	11,029	162	243	0	0	0	0	0	0	0	0	5	5
Eastern	12	5	4	3	65,464	341	149	0	0	0	2	2	10	0	1	43	54
Gulf Coast	40	24	6	10	271,372	826	753	0	0	2	8	10	22	15	6	127	170
Southwest	13	4	0	9	36,198	263	302	0	0	0	9	9	8	2	4	93	107
Louisiana	26	12	3	11	153,854	605	451	0	0	0	2	2	28	5	3	76	112
Northern	16	8	3	5	55,659	327	152	0	0	0	1	1	5	0	0	44	49
Southern	10	4	0	6	98,195	278	299	0	0	0	1	1	23	5	3	32	63
Arkansas	5	3	0	2	16,165	81	77	0	0	0	2	2	3	0	0	15	18
Mississippi	9	4	0	5	76,702	114	162	0	0	0	5	5	1	0	1	29	31
Southeastern States	1	0	0	1	3,965	19	23	0	0	0	1	1	0	0	0	16	16
Montana	8	6	2	0	12,951	125	144	1	0	0	0	1	7	0	0	13	20
Wyoming	0	0	0	0	0	75	86	0	0	0	0	0	8	0	3	20	31
Colorado-Utah	3	3	0	0	18,999	54	15	0	0	0	0	0	3	0	0	8	11
New Mexico	10	9	0	1	26,449	165	214	0	0	0	0	0	3	0	0	19	22
California	43	35	1	7	170,854	838	1,062	0	0	0	5	5	4	0	2	105	111
Total United States	560	323	68	189	1,906,869	12,678	11,718	9	0	6	69	84	226	22	55	1,425	1,728
Total previous week	568	315	64	189	1,873,549	12,098	11,132	6	0	2	52	60	217	22	52	1,356	1,647
Total June 16, 1945	586	302	61	223	1,997,818			8	0	2	90	100	253	9	60	1,510	1,832

Service wells included; *1, †16, ‡33.

MARKET QUOTATIONS

(Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gal. as of last Monday.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-78½†	73-75
Mid-Continent*	6.500-6.750	5.750-6.000
Texas Gulf Coast	6.375	5.150
New York Harbor	7.375	6.375
California		6.00-6.875

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.250	3.900
N. Texas (f.o.b. plant)	2.750	3.300
N. Louisiana (f.o.b. plant)	3.125	3.750
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.35
Conroe	1.53
Tepetate, Louisiana, avg. grav.	1.30
Illinois Basin	1.47
Pecos County, Texas	1.05
Bradford, Pennsylvania	3.10
Van, Van Zandt County, Texas	1.18

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.90	....	$1.16	$0.80
19-19.9	.94	....	1.18	.82
20-20.9	.98	$0.95	1.20	.84
21-21.9	1.02	.97	1.22	.86
22-22.9	1.06	.99	1.24	.88
23-23.9	1.10	1.01	1.26	.90
24-24.9	1.13	1.03	1.28	.92
25-25.9	1.17	1.05	1.30	.94
26-26.9	1.21	1.07	1.32	.96
27-27.9	1.25	1.09	1.34	.98
28-28.9	1.28	1.11	1.36	1.00
29-29.9	1.30	1.13	1.38	1.02
30-30.9	1.33	1.15	1.40	1.04
31-31.9	....	1.17	1.42	1.06
32-32.9	....	1.19	1.44	1.08
33-33.9	....	1.21	1.46	1.10
34-34.9	....	1.23	1.48	1.12
35-35.9	....	1.25	1.50	1.14
36-36.9	....	1.27	1.52	1.16
37-37.9	....	1.29	1.54	1.18
38-38.9	....	1.31	1.56	1.20
39-39.9	....	1.33	1.58	1.22
40 and above	....	1.35	1.58	1.22

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

(Week ended June 8, 1946)
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks—Gasoline	Stocks—Distillate	Stocks—Residual
East Coast	750	22,062	10,499	8,601
Appalachian	154	3,482	598	264
Ill., Ind., Ky.	787	19,565	4,676	3,507
Okla., Kan., Mo.	387	8,253	1,958	1,255
Inland Texas	229	3,075	320	697
Tex. Gulf Cst.	1,210	13,851	5,311	5,683
La. Gulf Cst.	316	4,070	1,825	1,192
N. La., Ark.	48	1,708	417	182
Rocky Mtn.	145	2,307	448	810
California	801	14,853	7,906	23,647
Total 6-8-46	4,827	94,146	33,958	45,938
Total 6-1-46	4,843	95,247	33,172	44,408
Total 6-9-45	4,892	87,486	30,176	39,376

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
June 8, 1946	218,589,000
June 1, 1946	220,885,000
June 9, 1945	221,552,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	June 15 crude oil	B. of M. June demand	June 8 crude oil
Alabama	1,150	750	1,150
Arkansas	79,200	79,000	79,250
California	876,250	848,000	867,450
Colorado	28,630	26,000	29,930
Eastern	63,700	64,200	68,200
Florida	250	250	250
Illinois	207,400	210,000	207,700
Indiana	19,300	18,000	20,900
Kansas	282,900	255,000	239,450
Kentucky	29,850	31,000	31,000
Louisiana	386,350	380,000	385,750
North Louisiana	90,250	.....	89,650
South Louisiana	296,100	.....	‡296,100
Michigan	50,130	46,000	47,420
Mississippi	63,450	57,000	64,350
Montana	26,800	22,000	23,010
Nebraska	750	800	750
New Mexico	97,600	98,000	97,600
Oklahoma	383,150	380,000	385,000
Texas	2,257,750	2,050,000	2,261,500
District 1	19,650	.....	19,650
District 2	155,650	.....	155,650
District 3	515,400	.....	515,400
District 4	229,600	.....	229,600
District 5	43,950	.....	43,950
East Texas	326,000	.....	326,000
District 6	107,350	.....	107,350
District 7B	32,400	.....	32,400
District 7C	28,450	.....	28,450
District 8	580,450	.....	584,200
District 9	132,400	.....	132,400
District 10	86,450	.....	86,450
Wyoming	109,500	104,000	105,510
Total United States	*4,964,410	4,670,000	4,916,170
Change from previous week	up 48,240		

Total production January 1-June 15 ..... †780,929,469 bbl.
Same period last year (crude, plus condensate) ..... 794,728,500 bbl.

*Not incl. 26,200 bbl. condensate. †Incl. 4,241,600 bbl. condensate. ‡Corrected from 290,100.

CRUDE OIL STOCKS 218,589,000 bbl. as of June 8—down 2,296,000 bbl. One year ago 221,552,000 bbl.

GASOLINE STOCKS 94,146,000 bbl. as of June 8—down 1,101,000 bbl. One year ago 87,486,000 bbl.

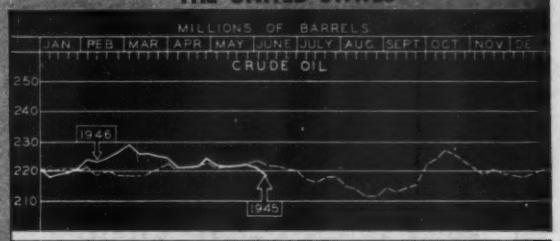
RESIDUAL FUEL-OIL STOCKS 45,938,000 bbl. as of June 8—up 1,530,000 bbl. One year ago 39,376,000 bbl.

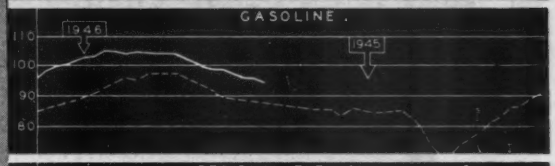
GAS OIL AND DISTILLATE STOCKS 33,958,000 bbl. as of June 8—up 786,000 bbl. One year ago 30,176,000 bbl.

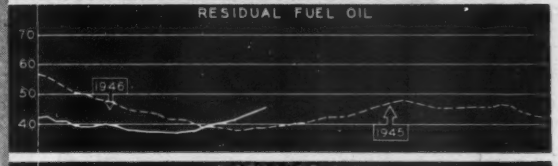
CRUDE-OIL PRODUCTION 4,964,410 bbl. (excludes 26,200 bbl. condensate) as of June 15—up 48,240 bbl. Year ago 4,882,250 bbl.

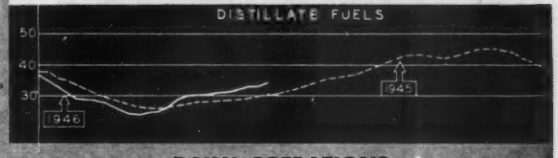
REFINERY RUNS 4,827,000 bbl. daily week ended June 8—down 16,000 bbl. One year ago 4,892,000 bbl.

OIL STOCKS IN THE UNITED STATES

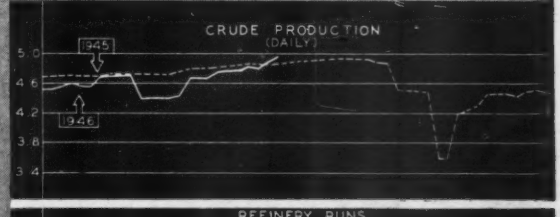


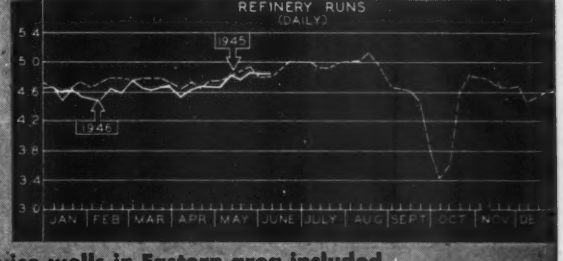




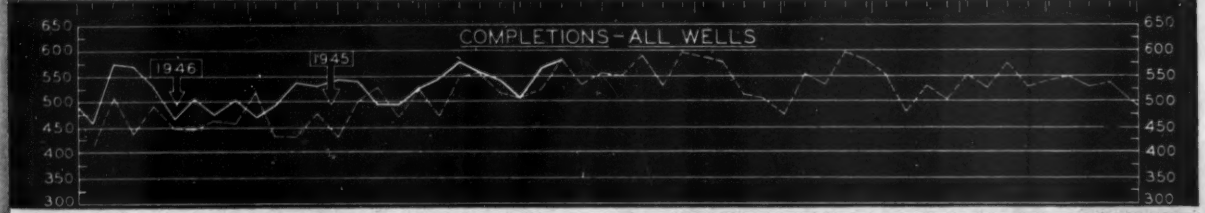


DAILY OPERATIONS





Solid line charts weekly completions, service wells in Eastern area included

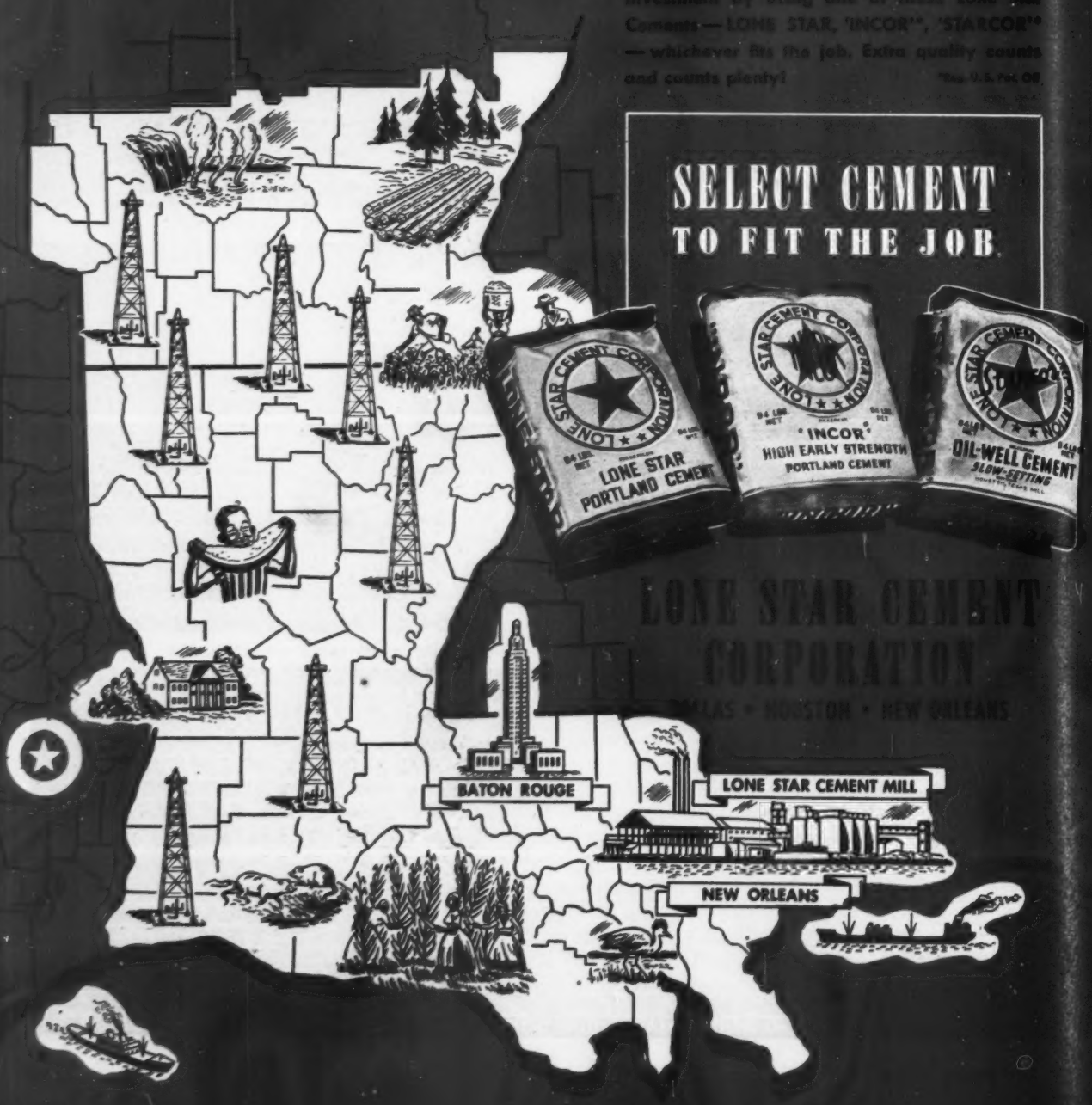


Protection

. . . for Oil-Well Investments in Louisiana-Arkansas Area

Cement is a fraction of the total cost of an oil well — yet, the entire investment depends upon its performance. By providing strong, dense, impervious shut-offs in thousands of wells in Louisiana-Arkansas and the other great oil-producing areas, Lone Star Cements have proved themselves great job performers. It is worth remembering that the performance of these Cements is pre-tested for the specific properties Oil Men need. Protect your own investment by using one of these Lone Star Cements — LONE STAR, "INCOR"*, "STARCOR"* — whichever fits the job. Extra quality counts and counts plenty!

*Reg. U.S. Pat. Off.



Exploration and Drilling

More "Strat" Traps in Montana?

THREE stratigraphic traps, two important and one minor, on the Sweetgrass Arch in northern Montana, have produced to date about 100 million barrels of oil. They are Cut Bank, Kevin, and Border. Recent developments indicate there may still be substantial additional possibilities for more traps.

Last October, some 5 miles northeast of Cut Bank, and west of Kevin, Carter Oil Co. opened a new area, getting oil at the top of the Madison lime, or Ellis-Madison contact. Three fairly small wells were completed. Other operators then drilled tests, one 7 miles south, one 6 miles south and 3 miles east, still another 7 miles north and east of the Carter discovery. All were either dry or had only shows in the Ellis-Madison contact.

Then Union Oil Co. recently drilled a well 2¼ miles south of the Carter discovery, and finding nothing at the contact, drilled 90 ft. into the Madison to discover what looked like a 30-bbl. pumper. But upon acidizing it began flowing 200 bbl. daily. Carter then went back in and deepened two of its three producers, and upon acidizing, got 250 to 300-bbl. wells.

The present status on the Sweetgrass Arch is that Kevin produces mostly from the Ellis-Madison contact, in a lime porosity trap, although located on a very large structure; Cut Bank produces from a sand porosity trap on a monoclinal flank of the Kevin dome, some distance west of the Kevin field; and Border produces from what may be a sand porosity trap, north of, and about midway between Kevin and Cut Bank. The main pay at Kevin is the top of the Madison; at Cut Bank the main pay is a sand just above the Ellis, which in turn lies just above the Madison; Border produces from the same pay as Cut Bank.

There are apparent relationships in the water found in all three fields, even in different sands within the same field, and also apparent related characteristics in the oil, that may indicate a common origin.

Previous to the recent discoveries, there was evidence to indicate that stratigraphic traps might be formed and produce oil almost anywhere in a broad region either in sands above the Ellis, or at the Madison contact at the base of the Ellis. Now the finding of oil in a break below the top of the Madison may indicate regional possibilities of a third pay where trap conditions are favorable.

Most wells in the region have stopped at the Madison contact, or slightly below, and the few that have drilled into the Madison within the producing fields do not appear to be particularly significant. This because apparently where one pay forms a good trap, the others do not usually develop much if any significance. Generally there appears to have been little chance of two good producing traps forming one above the other. But for any given location, there may now be three shots at finding a producing trap, instead of only two as formerly.

ROCKY MOUNTAIN

Rangely Field Receives ¼-Mile North Extension

DENVER.—The Rangely field in western Colorado was extended ¼ mile north in Algord Oil Co. 2 Guiberson, C NE NE 18-2n-102w, flowing and swabbing 142 bbl. per day at 6,465 ft., total depth. Last March, 1 Guiberson, C SE NE Section 18, which was an outpost, was completed at 6,575 ft. for 518 bbl. initial, cutting 8 per cent salt water. Subsequently the water decreased and the well was put on production without plugging back. However, it was looked upon as establishing the water line on the north. It was drilled 241 ft. into the Weber horizon. The second well stopped 55 ft. below the top of the pay.

Cobb-Stringer-Newton 1-D Government, C SE SE 4-1n-102w, an outpost on the south, about which there has been much controversy, is still testing. It is bottomed at 6,859 ft. After recovering 24 ft. of saturated cores at 6,835-59 ft., far below the depth at which the Weber normally was expected, it ran 7-in. casing to 6,816 ft., and after drilling plug, encountered water. Operators are not satisfied, however, and are preparing for additional tests. The hole is believed to have drilled into a fault, and there is a lack of agreement as to the top of the Weber and the identity of the horizon. It probably will take another well to determine the exact situation.

East Bailey Dome wildcat.—Wasatch Oil Refining Co. 1 Cameron Unit, SW SW SW 13-26n-89w, Carbon County, Wyoming, topped saturation in the Tensleep at 6,715 ft., finding the sand hard and tight, and drilled to 6,972 ft. It then plugged back with plastic and shot the sand with 503 qt. at 6,720-45 ft., and is cleaning out shattered material. Following the shot it made a flow of 100 bbl., about half of which was oil-mixed drilling mud, and then went dead. It received wide publicity as a major discovery, but the operator is not yet prepared to say that it is a commercial well.

Enos Creek lease sale.—Plans for the drilling of a deep test this year in the Enos Creek gas field, on the southwestern rim of the Big Horn Basin, in Hot Springs County, Wyoming, were disclosed with the offering for sale by the General Land Office of a lease on 120 acres in SE SE and W½ SE 25-46n-100w. Pacific Western Oil Corp. was high bidder with a bid of $216.66 an acre. The structure, which has at least 1,000 ft. of closure, is controlled by Stanolind Oil & Gas Co. and Ohio Oil Co. which will test the Tensleep. Stanolind drilled a well in SE NE Section 26 in 1924, testing the Cloverly, which had water, at a total depth of 3,992 ft. It then plugged back to a sand in the lower Frontier at 2,835-50 ft., and was completed for an estimated flow of 43,000,000 cu. ft. of gas per day. The well then was killed and none subsequently has been drilled.

New operations.—Twenty new operations were reported for the week in the Rocky Mountain area, of which 2 were in Colorado, 9 in Wyoming, 8 in Montana and 1 in Utah. These bring the total up to 125 since May 1. However, those reported for the current week include the largest number of important wildcats for any week this year.

The two in Colorado include John Farraly 1 Farraly-Hill, NW NE SW 21-11n-81w, Jackson County, a wildcat northwest of the North McCallum field, and Union Oil Co. 1 Seely, NE NE SW 32-4n-89w, Beaver Creek, Routt County. The latter will be a test of the Weber horizon. Location is ¼ mile north of 2 Milliken, drilled to 4,454 ft. in 1943 by Stanolind Oil & Gas Co., stopping after testing the Sundance sand. Transcontinental tested to the Morrison at 3,695 ft. in 1926 just west of the Stanolind well. Both were abandoned. New location is on geophysical surveys which indicated the axis has shifted to the north on the Weber.

In Wyoming, Texas Co. has made location for 3 Unit, SW NE NW 1-33n-95w, Alkali Butte structure, Fremont County, which will go to the Madison at 7,000 to 8,000 ft. This field was discovered in 1920 in a well drilled in SE NW Section 1 which made approximately 8,000,000 cu. ft. of gas in the Frontier at 2,841-2,943 ft. Subsequently several small oil wells were completed in the Shannon sand at the north end, and others tested down to and including the Sundance, the latter being found at around 5,000 ft. One well drilled to the Muddy in 1928 was reported to have made 700 bbl. per day in the Muddy sand. The field has been virtually shut in since its discovery.

General Petroleum Corp. made a location for 45-25-Government Unit, NE NE SW 25-27n-94w, Antelope Plain structure, Fremont County, 15 miles west of Lost Soldier field and 10 miles south of Crook's Gap field.

Cities Service Oil Co. will drill a 5,500-ft. test to the Fort Union on East Cherokee Ridge; Sweetwater County, in 1 Geier, SW NE NW 1-12n-95w, 4 miles east of two wildcats drilled by Mountain Fuel Supply Co. 2 years ago.

(Continued on page 167)

CALIFORNIA

Wilmington's 237 Zone Producing 20,000 Bbl. Daily

LOS ANGELES.—The 237 zone at Wilmington which has only recently been subjected to general exploitation has come up to expectations and will reach a much higher production level within the next few weeks. Present production of this sand, located below the Ford zone, approximates 20,000 bbl. per day from 14 wells and has stepped up the field production to 112,000 bbl. per day. A drilling check indicates the probable completion of 16 additional wells in the 237 zone within the next 2 weeks.

Because of the large initials of these new wells and the fact that this sand is producing considerably more gas than upper zones operators may be able to effect some kind of a plan to reduce production to 1,000-1,200 bbl. daily. Presently, operators are producing all the way from 900 to 2,150 bbl. per day depending upon geographic location and the number of offsets on production. If no reduction can be effected voluntarily, compulsory regulation may be necessary due to inability of natural-gasoline plants to handle present production plus anticipated gas from impending completions.

With new completions expected at the rate of one a day during the next 2 weeks, Wilmington has become the hot spot in California, supplanting Edison and Cymric and ranking second only to Coalinga Nose as far as excess production is concerned. Coalinga Nose is producing 19,000 bbl. per day above recommended quotas and Wilmington is producing 15,496 bbl. above the recommended June rate. Of the state's excess production of 43,000 bbl. per day, Coalinga Nose and Wilmington are accounting for 34,496 bbl. daily. Santiago and Buena Vista Hills with over 7,000 bbl. per day excess production account for practically all the remaining excess production.

Richfield Oil Corp. should have three new wells ready for production tests in the East Los Angeles field within the next 10 days and the company will probably continue normal development. The company's 1 Keller has already shown a normal flow on a formation test and a week or so ago 1 Edison flowed at a daily rate of 1,200 bbl. of clean 36°-gravity oil and 1,350,000 cu. ft. of gas from 8,000 ft. with the tester open at 7,964-8,000 ft. A string of 8⅝-in. casing has been landed in 1 Keller and 7-in. pipe has been landed in 1 Edison.

All acreage north of the Union Pacific Railroad tracks has been restricted by zoning regulations and until this can be changed no drilling can be undertaken in the northern part of the field. Because of this zoning, Union Oil Co., which has a lease on the plant property of Goodrich Oil Co., has been unable to proceed with its drilling program. Unfortunately a portion of this field will undoubtedly extend under the town-lot area in the northern section of the structure. A number of residences have been constructed in this region where the original fee owner reserved subsurface rights which can be exploited by directional drilling. Property owners, not participating in any royalty payments, have protested the lifting of restrictions and will undoubtedly continue to resist efforts to drill north of the railroad tracks.

The two deep tests that are being watched with interest did not show any material change during the past week. In the Belridge field of Kern County, Belridge Oil Co. was still digging at last reports and Ohio Oil Co. continued to work with its Gardena wildcat which is bottomed in basement schist at 10,288 ft. Ohio's present wildcat reached the basement several hundred feet higher than the schist was found in the first test.

Unnable to get a shoulder that will hold the packer, the company has found it necessary to set a cement plug to form the shoulder for the tester. The Wagonwheel sand, if found productive, would probably represent a discovery of primary importance.

Richfield Oil Corp. has been gathering leases at the north end of the South Belridge field and has just about completed its leasing program. Richfield hopes to get this wildcat going late in the summer. This projected test will have the Temblor and Wagonwheel sands as the objective.

Union is starting a wildcat in the Pico area of Los Angeles Basin and an early spud is anticipated. Location is in the southwest corner of Section 7-2s-11w and about ½ mile south of where Rothschild Oil Co. drilled three core holes a year or two ago. The joint test of six major companies on fee-owned acreage between El Segundo and Playa Del Rey fields is nearing the conglomerate-schist contact.

Locations this week were on about a par with completions indicating a stabilized rate of drilling. Unfortunately, completion lists and drilling charts do not contain wells that are being deepened from one zone to another and there are a number of deepening jobs at Wilmington and Edison which will be recompleted in many cases as large flowing wells.

CALIFORNIA WILDCAT FAILURES

Kern County, Devils Den: Barnsdall 2 Bates, 20-25s-19e, bottomed in barren gray sand, insufficient oil sand to make a well, TD 1,551 ft.

Devils Den: Wilshire 1 Kalloch, 11-25s-18e, bottomed in gray sand, Point of Rocks sand of Eocene age 2,807 ft., ran

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electric log and side-wall samples, TD 3,100 ft.

Edison: Hancock 1 Jobe Comm., 7-30s-29e, bottomed in gray Santa Margarita sand, Miocene age, cored barren gray sand 3,690-3,705 ft., only minor showings, TD 3,989 ft.

Merced County, Patterson: Don Pedro Oil Co. 1 Patterson, 9-6s-9e, bottomed in gray sand, form. test 3,950-55 ft. recovered fresh water, form. test 2,313 ft. was dry, Kreyenhagen 3,455 ft., Domengine silt 3,545 ft., TD 4,400 ft.

Orange County, Richfield: Texas 1 Vejar, 35-3s-9w, bottomed in hard gray sand, all sands barren, TD 3,564 ft.

CANADIAN FIELDS

Alberta Exploration Shifts To Northern Part of Province

CHATHAM.—In Alberta, the search for new oil and gas fields is definitely shifting to the northern part of the province. The latest development is the taking up by W. P. Taylor, representing Royalite Oil Co. of reservations on 523,000 acres in the Edmonton area. The acreage comprises three blocks, the largest, 198,000 acres, extending north from Leduc to Clyde and west from Cooking Lake to Range 26, a short distance west of Edmonton. Another block of 138,000 acres lies in Townships 50 to 53, Ranges 22-25; and the third block of 186,000 acres is in Townships 50-54, Ranges 19-22, extending west of Tofield.

Shell Oil Co. of Canada has added to its holdings in the Edmonton area 300,000 acres extending east from a point between Borrodaile and Lloydminster to west of Edmonton.

Turner Valley.—In North-Central Turner Valley, Royalite-Lowery 7, LSD 6, 11-20-3w5, has initial production of 190 bbl. from Madison lime at 8,148-8,381 ft.

Kinsella.—In the Kinsella field, east-central Alberta, Imperial-Kinsella 14, LSD 7, 28-45-9w4, southeast of the Kinsella gas area and in the direction of the Wainwright field, finished at 2,048 ft., encountering oil which rose 400 ft. in 1½ hours. Casing has been set and testing started. Northwest Utilities 22, LSD 6, 1-48-12w4, has finished at 2,232½ ft. and set 7-in. casing.

Provost.—In the Provost area, central Alberta, Imperial-Provost 1, LSD 3, 27-37-3w4, is deepening to Devonian limestone below 2,550 ft. after encountering a gas flow of around 500,000 cu. ft.

Antelope Hills.—In the Antelope Hills area of eastern Alberta close to the Saskatchewan boundary, Trans Alberta - Alliance 1, LSD 15, 19-20-1w4, bottoming at 3,930 ft., is reaming 9-in. hole to 3,775 ft. and will set 7-in. casing. Tests will be made of a zone at 3,770-3,810 ft. where good oil and gas shows were met. Alliance 2, LSD 2, 18-20-1w4, is hauling equipment and will drill to 3,000 ft. to test both the Bow Island and Madison horizons.

Quaich.—On the Quaich structure, in the southern Alberta foothills, Quaich Oil Corp. 1, LSD 12, 35-9-3w5, is below 1,087 ft. on a wildcat test of a previously untested area. The nearest test is Maxmont-Hunter 1, LSD 10, 20-9-2w5, on the Watson structure.

Tar sands.—An official statement in Parliament this week by Hon. C. D. Howe, minister of reconstruction and supply, dealt with the experimental work in the extraction of oil from the Athabaska tar sands carried on by Abasand Oils with financial backing from the federal Government. Hon. Mr. Howe stated that the experiments had proceeded far enough to show that the process attempted is not economically feasible. The pilot plant, which burned down, will not be rebuilt, he stated, as sufficient information has been obtained to warrant a judgment being made. The federal Government spent some $2,000,000 in the experiments.

N. CENTRAL TEXAS

Standard's Grayson Wildcat Drilling Below 8,590 Ft.

WICHITA FALLS.—Standard Oil Co. of Texas 1 Mitchell, J. B. McNair Survey, northern Grayson County wildcat, 2 miles north of Sherman, ran a 19-minute drill-stem test from 8,177-8,670 ft. below casing seat, with packer at 8,150 ft. in the pipe. There was a strong blow of gas for 15 minutes with recovery of 15 stands of gas and one stand of gas-cut drilling mud with no shows of oil or water. It was drilling below 8,590 ft. in brown sand and black shale.

Continental Oil Co. 1 Durham & Kempner, Charles O'Connor Survey, wildcat 3 miles northeast of Cundiff, Jack County, was reported to have stain of oil in conglomerate from 5,274-81 ft. A drill-stem test from 5,414-23 ft. failed and operator was drilling below 5,510 ft. in shale. Continental 1 Heath, C. A. Beatty Survey, southeastern Jack County wildcat southwest of the Risch pool, was changing control heads after running a cement job from 4,179-395 ft. in an effort to shut off a heavy gas flow which caused the hole to unload. The gas originally was reported coming from 4,430-45 ft. Total depth is 6,414 ft. in the Ellenburger, which was topped at 6,050 ft. No shows have been reported in the Ellenburger section.

Gatewood pool, Cooke County, had two

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completions this week. Electra field, Wichita County, had eight locations, Gatewood field four, and National field, Wilbarger County, three. National field has 12 drilling wells; Wilson field, Cooke County, 11; Sivell's Bend field, Cooke County, 6, and Hildreth field, Montague County, 4.

In West Central Texas, Jones County Regular field had two completions. This field and Shackelford County Regular field each had one location. Cisco field, Eastland County, has five drilling wells; Reddin field, Taylor County, four; Silver Valley field, Coleman County, Palo Pinto County Regular field, Stephens County Regular field and Loving field, Stephens County, each two.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Baylor County: Chas. E. Morrison 1 C. B Richardson, B. Gillen Sur. A-149, 9 mi. S Seymour, elev. 1,347 ft., Caddo 5,126 ft., Mississippian 5,505 ft., dry, TD 5,670 ft.

Cooke County: Kerr-McGee Oil Ind., Inc. 2 Wiggs, A. C. C. Bailey Sur., 5 mi. E and ½ mi. N Gainesville, elev. 891 ft., dry, TD 2,516 ft.

Texas 1 First National Bank of Saint Jo., T. J. and J. Ellerd Sur. A-1482, 5 mi. W and 6 mi. N Muenster, dry, TD 2,300 ft.

Montague County: Continental 1 Lynn Garlington, Sec. 3422, TE&L Sur., 1½ mi. N Bowie, elev. 1,132 ft., Ellenburger 7,271 ft., dry, TD 7,393 ft.

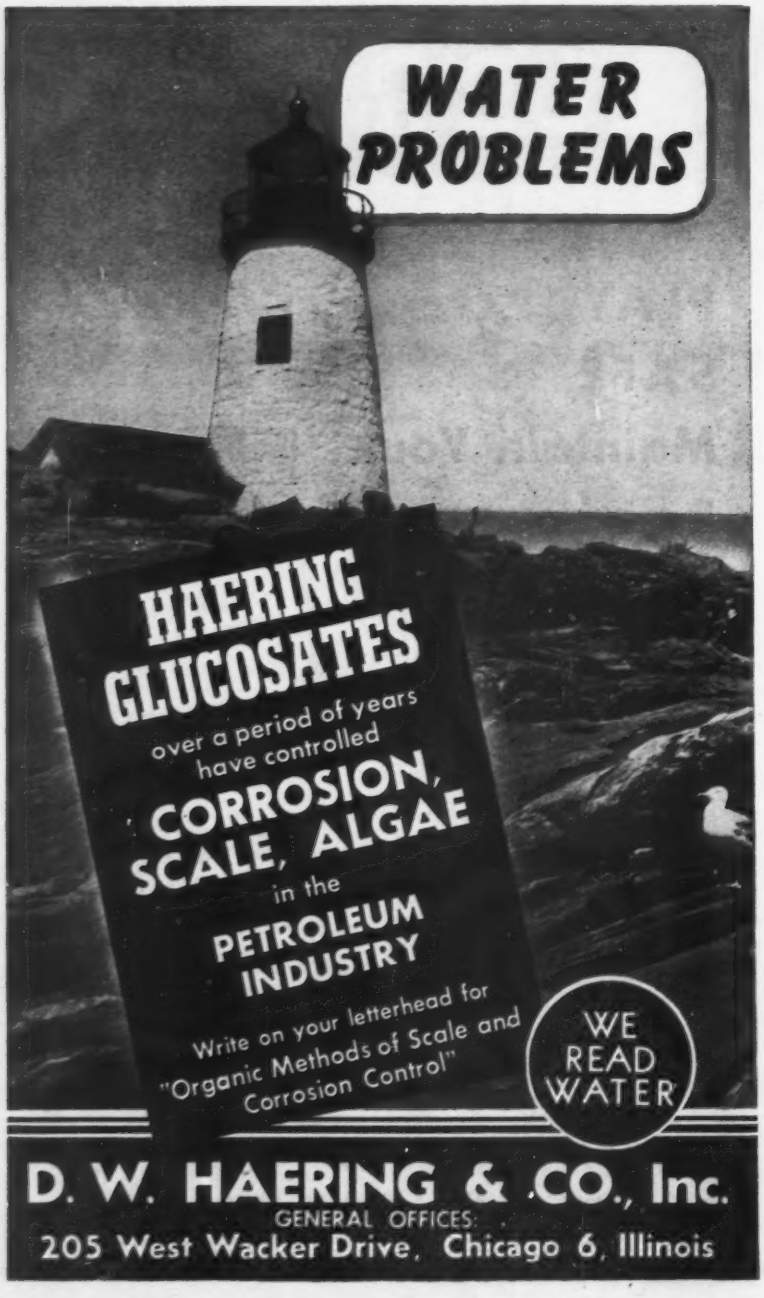
Wichita County: A. E. Blair 1 P. R. Brown, Blk. 311, Waggoner Colony land, 5 mi. N and E Electra, dry, TD 2,020 ft.

D. H. Bolin 1 Blanar, L. Powell Sur., 6 mi. N and 1½ mi. W Burkburnett, elev. 1,087 ft., dry, TD 2,006 ft.

Young County: Anzac Oil Corp. et al 1-D Graham, Sec. 3410, TE&L Sur., 2 mi. W and 6 mi. S Belknap, elev. 1,167 ft., dry, TD 2,712 ft.

WEST CENTRAL TEXAS WILDCAT FAILURE

Callahan County: R. F. Johns et al 1 A. E. Dyer, Sec. 40, BBB&C Sur., 4½ mi. NW Clyde, elev. 1,990 ft., King 1,900 ft., dry, TD 2,000 ft.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SOUTHWEST TEXAS

First Oil Production Opened in Muil Field

CORPUS CHRISTI.—First oil production for the Muil field in Atascosa County, has been opened by the Quintana Petroleum Co. 2 Muil, 1,320 ft. southwest of the discovery well. This well has been completed as a high ratio oil well in the Edwards lime, at 9,010-60 ft., top of lime 8,970 ft., for a reported 72-bbl.-per-day gage of 43°-gravity oil through a ¼-in. choke, tubing pressure 1,000 lb.

Humble Oil & Refining Co. 1 Mrs. Kate Bradshaw, oil discovery well at Carrizo Park field, about 2 miles southwest of Carrizo Springs, in Dimmit County, has gaged production of 30 bbl. per day on pump, 3 per cent salt water, 37°-gravity oil, through perforations at 2,795-2,807 ft. Total depth is 2,965 ft. This well is located in Lot 7, T&NO Survey 15.

Tom Graham 1 Chavana, wildcat, 3½ miles southeast of old Alta Mesa field in Brooks County, recovered nine stands of gas-condensate-cut mud on 30-minute drill-stem test through perforations at 7,303-09 ft., using ¼-in. top and ⅜-in. bottom chokes. Operators are now preparing to run production test. This will open new deep gas-condensate production in this area.

There were 29 new locations reported this week, 12 being wildcats, 3 in Duval, and 1 each in Atascosa, Bastrop, Bexar, Goliad, Jim Hogg, McMullen, Webb, Williamson, and Zapata counties. Of the 37 completions reported, 15 are dry wildcats, 3 each in Duval and Webb, 2 in Victoria, and 1 each in Atascosa, Bexar, Brooks, Calhoun, Live Oak, Refugio and Starr counties.

SOUTHWEST TEXAS WILDCAT FAILURES

Atascosa County: H. R. Smith and Skinner & Eddy Corp. 1 Hurst & Tartt, Jas. Wilkinson Sur. 144, 3 mi. NW of Fashing, dry, TD 3,917 ft. in Wilcox.

Bexar County: Geo. Parker and Chas. L. McCune 1 F. Cunningham, J. M. Urriegas Sur., 10 mi. S of San Antonio, dry, TD 500 ft.

Brooks County: Tom Graham 1 Prospero Mangell, 7 mi. W of Rachal, in La Encantada Gr., dry, TD 7,310 ft.

Calhoun County: L. C. Wynne 1 S. H. Wilborn, Manuel Lopez Gr., 10 mi. SW of Port Lavaca, dry, TD 7,720 ft.

Duval County: Forest Oil Corp. 1-A Peter McBride, Santos Garcia Gr., 1 mi. SE of Realitos, dry, TD 5,603 ft.

H. H. Howell 1 Mrs. Lizzie Singer, Sur. 241, 5 mi. N of Benavides, dry, TD 5,005 ft.

Southern Minerals Corp. 2 Juan Benavides, El Mesquite Gr., 5 mi. E of Bruni, dry, TD 3370 ft.

Live Oak County: H. H. Presnall 1 I. W. Griffith, L. J. Sparks Sur., 4 mi. SW of Whitsett, dry, TD 1,130 ft.

Refugio County: Seaboard Oil Co. of Dela. 1 H. V. Smaystria, J. Reese Sur., 2 mi. SW of Austwell, dry, TD 6,375 ft.

Starr County: Billstrom, Armstrong & Blackwall 1 Ramona Salinas de Mendoza, J. A. Salinas Sur. 302, 19 mi. NW of Roma, dry, TD 1,201 ft.

Victoria County: Hiawatha O. & G. Co. 1 Delia Joshua, F. G. Hidalgo Sur. A-61, 8 mi. SW of Victoria, dry, TD 5,353 ft.

Sterling O. & R. Corp. 1-C J. J. Welder, Phillip Graves League, 7 mi. E of Nursery, dry, TD 6,008 ft.

Webb County: H. B. Zachary Co. 1 Valera Vela Cuellar, Share 4, Cuellar Gr., 2 mi. NW of Bruni, dry, TD 2,606 ft.

Dulaney Oil Co. 2 State of Texas, State Survey 838, 1 mi. SW of Aviator field, dry, TD 2,168 ft.

D. J. Moss 1 J. O. Walker, GC&SF Sur. 264, 9 mi. N of Bruni, dry, TD 1,734 ft.

TEXAS GULF COAST

New Gas Pool Found In Jackson County

HOUSTON.—A new gas pool has been opened in Jackson County, 10 miles north of Edna, by Hewitt & Dougherty 1 A. A. Johnson, in the Wm. Whitaker Survey, Abstract 79. Drilled to a total depth of 4,760 ft., this well flowed a potential of 2,500,000 cu. ft. of dry gas per day through a ¼-in. choke, estimated 20,000,000 cu. ft. gas per day open flow, tubing pressure 1,650 lb., casing pressure 1,750 lb. Well is now shut in. The 5½-in. casing was set at 4,215 ft. and production is through 38 perforations at 4,150-60 ft.

A new gas pay has been opened in the Lane City pool of Wharton County by General Crude Oil Co. 8 Security Bank & Trust Co., in S. Castleman Survey 5. Total depth is 5,503 ft., with top of sand at 4,154 ft. Well tested dry gas through perforations at 4,154-56 ft., and is now shut in with a shut-in tubing pressure of 1,850 lb.

The second Hackberry test at Northwest Hamshire, just north of the Chambers County line in Jefferson County, flowed dry gas on initial test. McCarthy Oil & Gas Corp. 4 W. C. Tyrell Trust, in W. C. Dunshie Survey, Section 82, 900 ft. northwest of the 3 Tyrell discovery oil well, flowed dry gas through perforations in the Hackberry sands at 10,238-252 ft., with 3,600 lb. tubing pressure. Total depth is 10,563 ft., and 5½-in. casing is cemented at 10,428 ft. The 3 Tyrell flowed 217 bbl. of 39° gravity oil through perforations at 10,161-169 ft.

Production in the Sublime pool of Colorado County has been extended ½ mile to the southwest with the completion of Tide Water Association Oil Co. 2 D. L. Underwood, which flowed a potential of 270 bbl. of 32°-gravity oil, 12 per cent water, through 3/16-in. choke, tubing pressure 1,200 lb., with 800 lb. pressure on casing. Gas-oil ratio 1,081 to 1. Operators perforated with 59 shots from 9,507-9,514 ft. for production.

Production in the Sugar Valley field, Matagorda County, has been extended eastward with the completion of Skelly Oil Co. 1 C. C. Talcott. The well is now flowing clean oil, 5 bbl. hourly, through a 5/32-in. choke through perforations at 8,855-63 ft. Potential has not been made. Total depth of the well is 9,508 ft. and 5½-in. casing is cemented to 9,168 ft. for completion.

There were 19 new locations reported this week with 6 being wildcats, 2 each in Harris and Matagorda counties, and 1 each in Fayette and Montgomery counties. One new gas pool in Jackson County and one new gas pay in Wharton County were completed this week, while two wildcats, one each in Chambers and Jackson counties, were dry.

UPPER GULF COAST SUCCESSFUL WILDCATS

Jackson County: New gas pool—Hewit & Dougherty 1 A. A. Johnson, Wm. Whitaker Sur., Abst. 79, 10 mi. N of Edna, TD 4,760 ft., perf. 38 holes 4,150-60 ft., PT 2,500,000 cu. ft. gas per day through a ¼-in. choke, dry gas, estimated 20,000,000 cu. ft. gas per day open flow, TP 1,650 lb., CP 1,750 lb., shut in.

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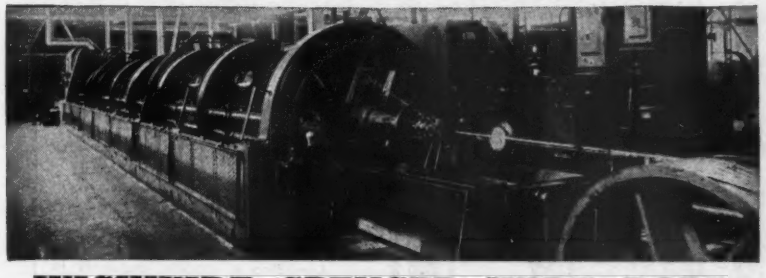

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Fig. 107

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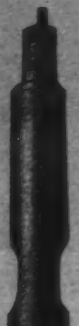


Fig. 115

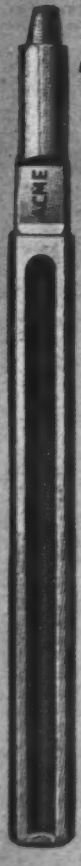
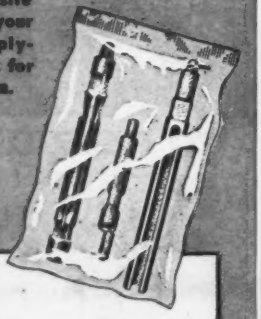


Fig. 109



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ACME DRILLING & FISHING TOOLS

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Wharton County: New gas pay in Lane City pool—General Crude Oil Co. 8 Security Bank & Trust Co., S. Castleman Sur. 5, TD 5,503 ft., top sand 4,154 ft., perf. 4,154-56 ft., dry gas well, TP 1,750 lb., SITP 1,850 lb., shut in.

UPPER GULF COAST WILDCAT FAILURES

Chambers County: Gulf 2 S. Steenerson et al, T&NO Sur., Sec. 79, 3,375 ft. SE of nearest production in Fig Ridge field, dry, TD 9,021 ft.

Jackson County: Joseph Hornberger, Jr. 1 J. M. Bennett, in Valentin Garcia Grant, 1 mi. SW of LaSalle, dry, TD 5,751 ft.

PERMIAN BASIN

Schleicher County Gets First Major Oil-Producing Area

MIDLAND.—The first major oil producing area has been opened for Schleicher County by Cooper Gas Co. 1-A Jess Koy, Section 38, Block L, GH&SA Survey, on the north flank of the Page gas field. It first showed for production on a 2-hour test through perforations from 5,605-40 ft. when it flowed 90.75 bbl. of oil from the Strawn lime after being treated with 3,000 gal. of acid. It was then perforated with six shots per foot from 5,520-70 ft. and treated with 3,000 gal. acid. After recovering load, the well kicked off and flowed 40, 50, and 60 bbl. of oil per hour during three 15-minute periods. On an official 2-hour gage the well produced 110 bbl. of high-gravity oil through open 2-in. tubing. Flowing tubing pressure was 180 lb. and shut-in pressure 875 lb. Gas-oil ratio was 1,385 to 1. Operator will perforate opposite a gas-bearing zone from 5,340-5,413 ft. Commercial production of gas may result in an attempt to produce oil through tubing and gas through casing.

Shell Oil Co., Inc. 1 Nelson, Section 8, Block A-40, Public School Lands, Ellenburger discovery in western Andrews County, has been completed to flow 478.71 bbl. of 43°-gravity oil in 24 hours cut 7 per cent wash water. Gas-oil ratio was 373 to 1. Total depth is 10,606 ft. Humble Oil & Refining Co. 3 Parker, Section 23, Block A-41, Public School Lands, has assured prolific production from the Ellenburger for the Martin pool of Andrews County. On a 35-minute drill-stem test from 8,885-8,945 ft., there was gas to the surface in 30 minutes and oil and gas-cut mud in 32 minutes. The well continued to flow for 15 minutes after the tool was closed and headed oil with each three to five stands pulled. Operator estimated the well filled drill pipe at the rate of 254 bbl. per hour.

The Texas Co. 1-P University, Section 15, Block 12, University Land, has opened a new Clear Fork area in southwest Andrews 6 miles northwest of the Martin pool. The well was started as the Atlantic Refining Co. 1-B University, taken to 4,965 ft. and temporarily abandoned. The Texas Co. cemented 4,098 ft. of 9⅝-in. casing, then deepened to 7,269 ft. A 2-hour drill-stem test was run with packer at 7,127 ft. There was gas to the surface in 13 minutes. Operator pulled 1,710 ft. of dry drill pipe, after which the well unloaded oil. Final recovery was 5,110 ft. of oil and 120 ft. of muddy drilling water. Estimated fill-up rate was 27 to 30 bbl. per hour. The test will be deepened 50 ft. and be tested again.

TXL field, Ector County, had three completions this week; Fullerton field, Andrews County; Wasson field, Yoakum County; Foster field, Ector County; Keystone-Colby field, Winkler County; and North Ward Estes field, Ward County, each had two. Welch field, Dawson County, and Sharon Ridge field, Scurry County, each had five locations; Fullerton field four and Sand Hills Tubb field, Crane County, three.

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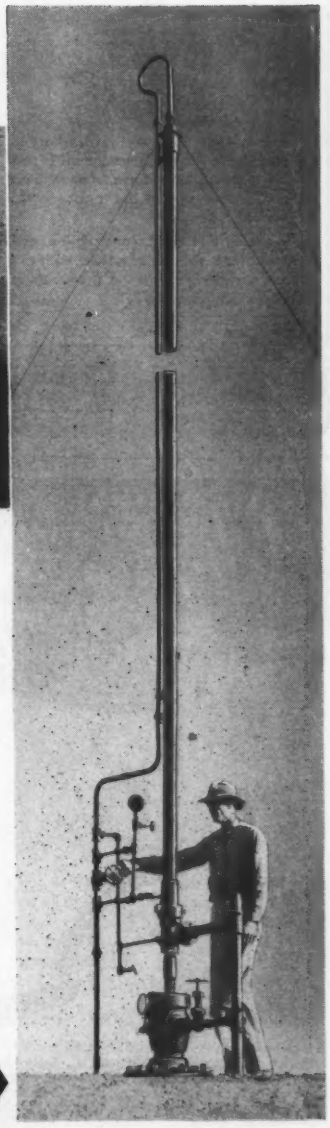

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Two new Kobe devices, designed around the use of *Fluid Power,* provide the solution for one of the most vexing problems of oil production. One of the devices is a hydraulic lift, installed at the wellhead, which makes it possible to utilize the pumping power on the lease to raise and lower paraffin-removing scrapers inside the production tubing. Switching *Fluid Power* from well-pumping to actuating the scrapers is merely a matter of closing one valve and opening another. Controlling paraffin is thus made an easy, routine operation.

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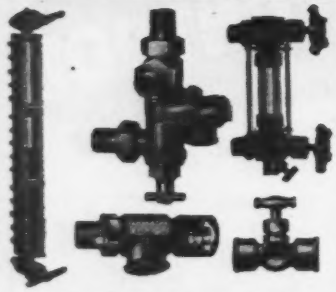
PRODUCTS



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TXL field has 37 drilling wells; Keystone-Ellenburger field 34; Fullerton field 25; Welch field 14; Block 31 field, Crane County, 13; and Martin field, Andrews County, 9.

WEST TEXAS WILDCAT FAILURES

Crockett County: Garrett M. Smith 1 L. B. Cox, Jr., Sec. 26, Blk. 2, I&GN Sur., elev. 2,209 ft., dry, TD 1,170 ft.

Garrett M. Smith 1 V. B. Cox, Sec. 39, Blk. ST, TCRR Sur., elev. 2,207 ft., San Andres 900 ft., dry, TD 1,125 ft.

Crosby County: Midland Oil Co. 1 W. H. Belding, Sec. 4, Blk. D-15, Abstract 1060, elev. 2,614 ft., dry, TD 3,203 ft.

Howard County: Cherry & Kidd 1 O. E. Hamlin, Sec. 15, Blk. 33, T-2-N, T&P Sur., elev. 2,668 ft., San Andres 3,310 ft., dry, TD 3,762 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Boller & Rutledge 1 Iles, 10-17s-32e, a test in the undeveloped areas between the Maljamar and West Roberts fields in west central Lea County, flowed naturally 250 bbl. of oil from sandy lime pay from 3,967-74 ft. on a 24-hour official test. The Texas Co. 4 Blinebery, 20-22s-38e, east of lower Permian lime production in the Drinkard field of eastern Lea, was drilling below 8,090 ft. still in granite wash. The well missed the Drinkard field pay. Reslar Oil Co. 1-A State, 1-13s-31e, extension to the Caprock field, was completed for 75 bbl. of oil daily after shooting with 12 qt. of nitroglycerin from 3,015-43 ft. Humble Oil & Refining Co. 1-B Federal-Leonard, Ellenburger test ¼ mile north of the discovery of the Dublin pool of eastern Lea, was drilling below 12,062 ft. in shale and lime, running low. It is currently New Mexico's deepest operation.

Square Lake and Empire fields, Eddy County, each had two completions this week. Caprock field, Chaves and Lea counties, had three locations. Caprock field has 26 drilling wells; Drinkard field, Lea County, 16; Square Lake field, 13; Grayburg-Jackson field, Eddy County, 12, and Paddock field, Lea County, six.

SOUTH LOUISIANA

Good Producer Added In Black Bayou Field

NEW ORLEANS.—A new producer has been added to Black Bayou field in Cameron Parish by Shell Oil Co. 62 Watkins, 8-12s-12w. Sands showing oil were picked up from 6,795-6,821 ft., and hole was drilled to a total depth of 7,200 ft. On potential gage the well flowed 259 bbl. of 40°-gravity oil daily through a 9/64-in. choke with a gas-oil ratio of 612 to 1. Tubing and casing pressures equalized at 700 lb. Production string was cemented to 6,880 ft. and production is through perforations at 6,795-6,815 ft.

Sun Oil Co. 1 Lavergne-Brinkhaus is a new oil well for Shuteston field of St. Landry Parish, in 37-7s-4e. On 24-hour gage well flowed 162 bbl. of 38°-gravity oil through a ½-in. choke, tubing pressure 1,400 lb., casing pressure 700 lb., showing 0.1 per cent basic sediment with a ratio of 724 to 1. Total depth is 10,400 ft., with 7-in. casing cemented on bottom. Production is through 20 perforations at 9,501-06 ft.

Confirmation test at Little Temple discovery area in LaFourche Parish has been plugged as dry by Humble Oil & Refining Co. The 2 Louisiana Delta Farms Co., 19-17s-22e, ½ mile northeast of the discovery well, was drilled to a total depth of 10,726 ft. with no commercial shows encountered.

Also in LaFourche Parish, J. R. Meeker 1 Sidney Gaubert, northwest extension test in the LaFourche Crossing field area, 36-15s-17e, was completed as dry at total depth of 10,210 ft.

Humble commenced operations at its 14,000-ft. exploration test in the Weeks Island field area of Iberia Parish. The 1-B J. M. Burguieres Co., Ltd. in 44-14s-7e, is drilling below 103 ft. where 20-in. conductor pipe has been cemented.

Ten new locations, one a wildcat in Assumption Parish, were reported this week. Four oil wells in proven areas were completed with six dry holes, one a wildcat in Cameron Parish. Cameron Parish received the greatest activity, receiving three completions. Jefferson Parish was next with two.

SOUTH LOUISIANA WILDCAT FAILURE

Cameron Parish: Magnolia Pet. Co. 44 Cameron Meadows, 27-14s-13w, 1 mi. SE of production in Cameron Meadow field, dry, TD 8,675 ft.

EASTERN TEXAS

Magnolia's Marion Discovery Pumps 116 Bbl. Oil

DALLAS.—Magnolia Petroleum Co. 1 S. L. Orr, R. B. Fowler Survey, discovery 3½ miles southwest of Avinger in Marion County, has been completed to pump 116 bbl. of oil and 36 bbl. of salt water in 24 hours in the Travis Peak through perforations from 7,568-77 ft. It was drilled to 10,513 ft. and plugged back to 7,580 ft. The Travis Peak section was topped at 7,527 ft., the Travis Peak sand at 7,569 ft. and the Cotton Valley at 9,265 ft.

Lone Star Production Co. 1 Ben Hearne, J. E. Clancey Survey, 1 mile north of Opelika, Henderson County, is the second Rodessa oil well for the Opelika gas area. On official 24-hour test through ¼-in. choke, it flowed 221.81 bbl. of oil with 872,000 cu. ft. of gas. Tubing pressure was 725 lb. and casing pressure 1,320 lb.

B. F. Phillips 1 C. C. Crews, Leonard Perkins Survey, wildcat 7 miles south of Gladewater, Gregg County, is reported to have logged 5 to 10 ft. of pay sand in drilling to 4,026 ft. in the Woodbine. Operator set 5½-in. casing at 3,800 ft. K. L. McHenry 1 Williams, J. E. Clark Survey, wildcat 4 miles southeast of Caddo Mills, Hunt County, was drilling below 3,950 ft. With elevation of 536 ft., the test topped the Woodbine at 2,325 ft. W. F. Glenn of Tyler, Tex., has staked 1 E. R. O'Neal, a 4,000-ft. wildcat in the Jose Leal Survey in Milan County. It is in the northwest corner of the tract.

Carthage field, Panola County, had four completions this week and Hawkins field, Wood County, had two. Hawkins field had six locations, Mt. Sylvan field, Smith County, three, and Carthage field two. Carthage

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field has 30 drilling wells; Hawkins field 19; New Hope field, Franklin County, and Sand Flat field, Smith County, 6; Opelika field, Henderson County, 4.

EASTERN TEXAS WILDCAT FAILURES

Navarro County: Woodbine Oil Corp. 1 J. H. Burke, Thos. Edmondson Sur., 1 mi. N Powell, elev. 375 ft., Wolfe City 1,763 ft., dry, TD 2,080 ft.

Smith County: Edward Pace et al 1 R. E. L. Johnson, A. Kent Sur., 4 mi. W and slightly N Mt. Sylvan, elev. 429 ft., Paluxy 7,360 ft., dry, TD 7,728 ft.

MICHIGAN

Michigan Operators Find Two New Fields

SAGINAW.—Dry holes were recorded with discouraging regularity as Michigan oil and gas operations recorded 19 completions while preparing 24 new locations. Fifteen of the completions were dry holes, one was a small wildcat producer in Oceana County and the other three were gas wells, two in Mecosta County's Austin field, the other a small wildcat in Green Township, Mecosta County. The new locations are in 13 counties, four in Bay, four in Van Buren, two each in Allegan, Clare, Isabella, Kent and Osceola, one each in Arenac, Ogemaw, Ottawa, Montcalm, Genesee and Barry.

MICHIGAN SUCCESSFUL WILDCATS

Mecosta County, Green Township: Ashby Drilling Co. 1 Switzer, NW SE NW 18-16n-10w, gas well, 1,825,000 cu. ft., TD 1,260 ft.

Oceana County, Crystal Township: Charles W. Teater 2 Lula Ryan, SE NE NW 16-16n-16w, 45 bbl. from Traverse limestone, TD 1,866 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Russell W. Cooper 1 Nellie Liechti, SW NW NE 11-2n-13w, dry in Traverse limestone, TD 1,492.

Casco Township: J. E. Hood 1 Carolina Sesyskowski, NE SE NE 20-1n-16w, dry in Traverse limestone, TD 1,399 ft.

Manlius Township: J. W. Lang Co. 1 Gerrit-Menken, SW NE NW 11-3n-15w, dry in Traverse limestone, TD 1,408 ft.

Calhoun County, Newton Township: Clifford A. Perry 1 Syril C. Kirkland, NE SW SE 34-3s-7w, dry in Traverse limestone, TD 1,456 ft.

Missaukee County, Forest Township: L. R. Reese 1 Grice, NW SE SW 20-23n-7w, dry in Marshall, TD 1,457 ft.

Reeder Township: McClure Drilling Co. 1-A Jameson, NE NW NW 31-22n-7w, dry in Dundee, TD 4,118 ft.

Oscoda County, Big Creek Township: Ohio Oil Co. 2 Mio unit, SE NW NW 22-25n-2e, dry, TD 4,253 ft.

Gratiot County, New Haven Township: McClure Drilling Co. 1 P. Pieffer, NW NE SW 30-10n-4w, dry in Dundee, TD 3,190 ft.

Rocky Mountain Area

(Continued from page 157)

Paint Rock Development Co. has derrick up for 1 Hogan-Government, C NW SE 12-49n-90w, Paint Rock structure, east side of the Big Horn Basin in Big Horn County, 4 miles southwest of five dry holes drilled in 1914 to shallow depths.

Texas Co. 3 Unit, C NW NW 13-49n-102w, located 10 miles southwest of the Oregon Basin field, on the south dome of the Spring Creek anticline, will test the Embar-Tensleep-Madison horizons. Location is about a mile from a test drilled to 4,245 ft. in 1930, which produced approximately 185 bbl. initial from the Embar, Tensleep, and Amsden, but which was mudded in for lack of a market for black oil at the time.

Resolute Oil Co. has made a location for 9 Northern Pacific, 1,320 ft. west of its 8 Northern Pacific in the Badger Basin field, Park County, which last week made 950 bbl. of pipe-line oil in 11 hours. Mountain Fuel Supply Co. 3 Unit, NE SW NE 12-16n-113w, Church Buttes structure, Uinta County, is a tentative location 1½ miles west of its recent big discovery at 12,887 ft., total depth. This well and No. 2 Unit, 5 miles to the north and east, now drilling, both will go below 12,000 ft.

The Montana locations are all development wells and include two in Bowdoin, and one each in Cat Creek, Kevin-Sunburst, Bannatyne and Cedar Creek. The Utah location is George Callahan No. 1, NE NE NE 32-26s-13e, on the Nequoia Arch in Emery County. It will go to the Coconino (Permian) sand. The anticline runs due south from the San Rafael Swell.

Completions.—Ten wells were completed, of which 8 were oil wells with initial production of 1,622 bbl., and 2 were gas wells. These were distributed: 3 in the Rangely field in Colorado for 953 bbl., no completions in Wyoming, and 7 in Montana, of which 5 were oil wells for 669 bbl. and 2 were small gas wells in the Bowdoin and Cedar Creek fields. One of the oil wells was a wildcat in North Cut Bank, deepened and recompleted for 239 bbl.

MONTANA SUCCESSFUL WILDCAT

North Cut Bank, Glacier County: Carter Oil Co. 1 Larmon, C SE NE 12-36n-6w, TD 3,094 ft., recompleted after deepening from 3,073 ft., flowed 230 bbl. and 125,000 cu. ft. of gas first 24 hours after acid, 1,000 gal. from Madison, top 3,046 ft.

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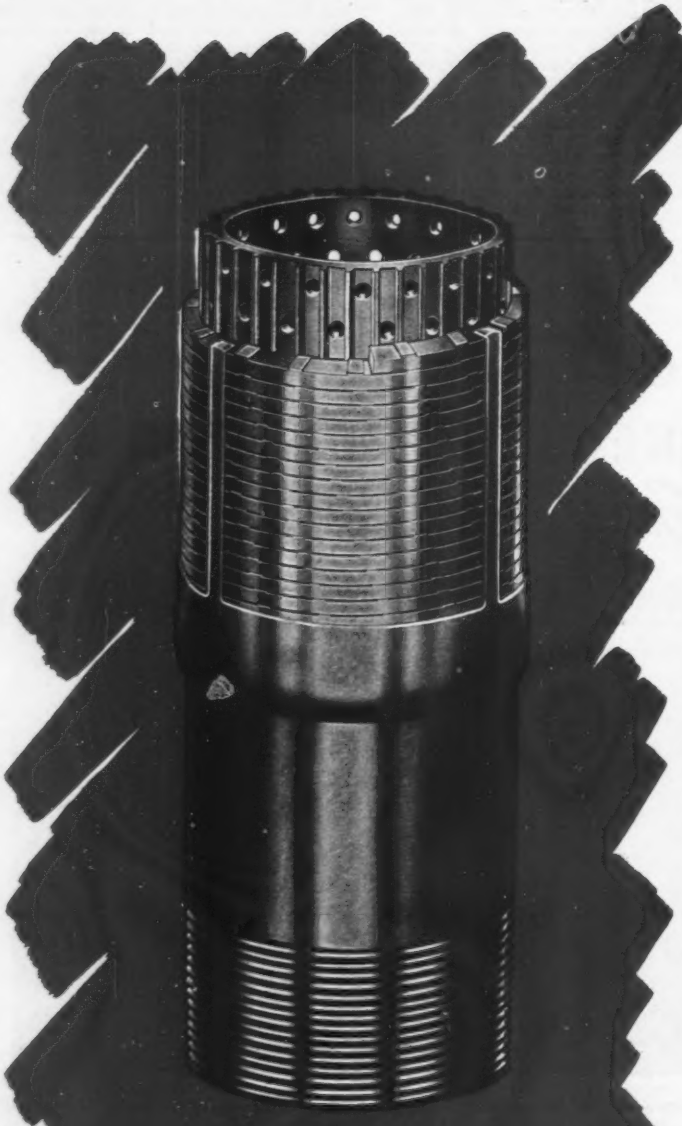

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ILLINOIS

Interesting Wildcat Test Staked in Richland County

MATTOON.—F. J. Fleming and A. K. Swann have staked location for a wildcat test, the 1 Lyman F. Reed, SE SE NE 27-3n-10e, and expect to start drilling operations soon. This well is about 1 mile northeast of production in the North Calhoun field and is believed by some geologists to have a better than average chance of success.

Washington County's prospective pool opener, the L. A. Schumacher-Ben J. Taylor 1 Andrew Lamezyk, NE NE NE 12-3s-2w, is now undergoing a fillup test of the Benoist sand at 1,416-31 ft., total depth. A 2-hour drill-stem test at this depth recovered 20 ft. of clean oil and 65 ft. of oil-cut mud with no water, and casing was set on the sand. This well is 1 mile north of production in the West Dubois pool.

Operators in the Keenville field of Wayne County continue to add good wells along the western edge of the field. During the past week three large producers were completed in the McClosky lime in 28-1s-5e. They were the Joe Slivka 2 Webber-Sledge, SW SW NE, which gaged 500 bbl. daily initially; M. J. Mitchell 1 N. Keene Cons., NE SE, 200 bbl. daily, and the Oldfield et al 1 J. C. Keen, NE NE SE 450 bbl. daily.

Illinois completions showed a strong upward trend during the week with 35 new oil wells and 16 dry holes reported. Included were three wildcat producers which opened fields in Clay, Hamilton, and White counties, and five dry wildcats. New operations also showed an increase with 84 starts reported. These included 11 wildcats. Coles County led in number of new operations with 16 development wells and 1 wildcat, while Wayne followed closely with 9 development wells and 4 wildcats.

ILLINOIS SUCCESSFUL WILDCATS

Clay County: T. B. Dirickson 1 Howell, SE SW SW 9-2n-7e, pumped 175 bbl., Aux Vases sand 2,959-70 ft., TD 3,205 ft., PB 2,975 ft.

Hamilton County: H. H. Weinert 1 Hall, NE NW NW 29-3s-7e, pumped 26 bbl., perf. 3,398-3,414 ft., 3,334-46 ft., 3,246-56 ft., Aux Vases sand 3,249-90 ft., Rosiclare 3,335 ft., TD 3,449 ft., PB 3,426 ft.

White County: W. O. Allen 1 Hannah Bros., NW NE SE 28-5s-10e, pumped 50 bbl., Cypress sand 2,706-28 ft., Weiler 2,728-37 ft., TD 2,743 ft.

ILLINOIS WILDCAT FAILURES

Clay County: J. L. Black 1 Stanley, N½ SE NW 8-4n-8e, dry at 3,018 ft., Glen Dean 2,466 ft., Barlow 2,621 ft., Cypress sand 2,670 ft., Ste. Genevieve 2,962 ft., Fredonia 2,996 ft., McClosky 3,000 ft.

Clinton County: R. J. McFarland 1 Kock, NW SE SW 7-2n-3w, dry at 2,444 ft., Cypress sand 964 ft., Benoist sand 1,049 ft., Aux Vases sand 1,110 ft., Ste. Genevive 1,216 ft., St. Louis 1,310 ft., Devonian 2,345 ft., Silurian 2,365 ft.

Fayette County: Claude Neon Light 1 Poland, NW SW NE 31-6n-2e, dry at 2,141 ft., Tar Springs 1,422 ft., Glen Dean 1,499 ft., Cypress sand 1,670 ft., Paint Creek 1,786 ft., Benoist sand 1,841 ft., Aux Vases sand 1,879 ft., Rosiclare 1,956 ft., Fredonia 2,022 ft., McClosky 2,062 ft., St. Louis 2,135 ft.

Franklin County: Phillips 1 Thraw, NW SW NE 36-6s-3e, dry at 3,219 ft., Menard 2,188 ft., Tar Springs 2,372 ft., Glen Dean 2,416 ft., Cypress sand 2,770 ft., Benoist sand 2,878 ft., Ste. Genevieve 3,023 ft., McClosky 3,044 ft., St. Louis 3,217 ft.

Washington County: Wiser 1 W. Kasban, NW SE NE 34-2s-1w, dry at 1,797 ft., Tar Springs 1,134 ft., Glen Dean 1,174 ft., Cypress sand 1,436 ft., Paint Creek 1,465 ft., Benoist sand 1,538 ft., Aux Vases 1,610 ft., Ste. Genevieve 1,705 ft., Rosiclare 1,730 ft., Fredonia 1,756 ft.

APPALACHIAN FIELD

Elk-Poca Field Gets Record Gas Well

PITTSBURGH.—In the new Oriskany extension to the Elk-Poca field in Elk district, Kanawha County, West Virginia, Columbian Carbon Co. completed a large gas well, 893 Harriet Morton, which gaged 14,235,000 cu. ft. natural. From surface elevation of 865 ft., the Corniferous lime was topped at 5,032 ft., Oriskany 5,148 ft., and gas 5,165-69 ft. Total depth is 5,169 ft.

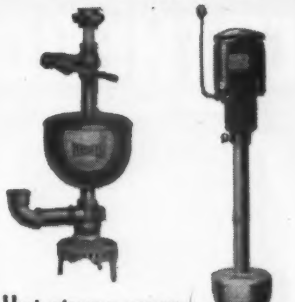
In Ripley district, Jackson County, West Virginia Gas Corp. completed the wildcat 534 Howard Hopkins as an Oriskany gas well gaging 1,300,000 cu. ft. after shot. From surface elevation 718 ft., the Corniferous lime was logged at 4,839 ft., Oriskany 4,958 ft., gas 4,973-84 ft., shot 4,976-84 ft., and total depth 5,007 ft.

In Buffalo district, Clay County, Pittsburgh & West Virginia Gas Co. completed a large Injun sand gas area, 8084 Elk River Coal & Lumber Co., gaging 2,711,000 cu. ft. from total depth of 1,667 ft.

New locations in West Virginia totaled 24 and were located in Barbour, Calhoun, Clay, Gilmer, Fayette, Kanawha, Lincoln, McDowell, Marion, Ohio, Putnam, Ritchie, Upshur, Wayne, and Wyoming counties.

In North Strabane Township, Washington County, Southwest Pennsylvania, Charles E. Young is completing a test on John Gregor (H. H. Beabout) farm in the Gordon sand, depth about 2,500 ft., and it flowed

PENBERTHY
SUMP PUMPS



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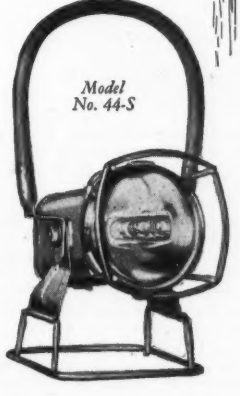

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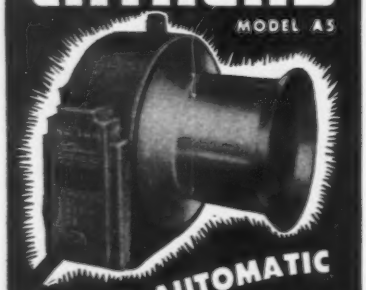
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100 bbl. the first day. To the west, Beedle et al completed 3 Hugh Boyles good for 20 bbl. per day with the Gantz sand at 2,268-2,321 ft. It made 50 bbl. the first day, and may be deepened. Still farther west, Robert Murray et al is drilling a test on John Yoney farm and there was a good showing of oil in the Gantz sand but it is being drilled to the Gordon.

New locations totaled seven and were located in Boggs, Armstrong, Greene and Washington counties.

OHIO, KENTUCKY

Muskingum County Field Extended Southward

COLUMBUS.—Wasson et al in a ¾-mile move south of the Eppley well, southwest Newton Township, Muskingum County, found 564,000 cu. ft. of gas in the Clinton on Daisy Roberts, Section 35. Sand was logged at 3,390-3,424 ft. The Ohio Fuel will drill an offset well directly south.

The North Wellington pool continues to expand with productions in both the first and second Clinton. Ohio Fuel 1 A. J. Bucholz, Lot 145, Pittsfield Township, Lorain County, drilled through the upper sand at 2,181-88 ft. with a gage of 1,130,000 cu. ft. In the same township, Hanley & Bird have now made offset locations both east and west of their discovery in Lot 88.

Two offsets to Ohio Oil's discovery in the center of Madison Township, Columbiana County, have been made. Eberly 1 Green, Section 14, is drilling, and Ohio Oil et al 1 Prescott, same section, is a location.

Of the 29 locations reported for the week, Ashland field accounted for 10, Sandyville 6, Cambridge 4, Lancaster and Mount Vernon 3 each. Twenty-two wells were completed with Ashland, Cambridge, Mount Vernon and Sandyville each having four.

EASTERN KENTUCKY ACTIVITIES

ASHLAND.—One of the largest completions in months was noted during the week ending June 8, a Pike County well.

Kentucky-West Virginia Gas Co. completed Well No. 802 on the J. A. Taylor property, going to a total depth of 1,898 ft. for a daily open flow of 3,834,000 cu. ft. of gas in Maxon.

Two other completions were reported by Kentucky-West Virginia Gas Co., Well No. 812 on the E. L. Pinson property, Pike County, total depth 1,149 ft., open flow of 492,000 cu. ft. in Salt sand; and Well No. 5640 on the Silas Francis property, Knott County, total depth 3,088 ft., open flow 119,000 cu. ft. in shale, after shot.

Kaiser Oil Co. completed Well No. 4 on the John Meadows property, McCullough Branch, Bath County, 219 ft., 4 bbl.

WESTERN KENTUCKY

OWENSBORO.—Western Kentucky operators finaled six oil wells and one dry hole during the past week, none of which were wildcats. Four of the oilers and the dry hole were located in the Dixie pool of Henderson County.

One new wildcat test was started during the week in Muhlenberg County, the Ryan Oil 1 S. T. Smith, 15-J-31. This well is now drilling at 93 ft. with 10-in. surface casing set at 60 ft. Other new operations were confined to three starts in Henderson County.

INDIANA

EVANSVILLE.—Successful completion last week of the Walter W. Willis et al 1 Mary Fretageot, NE NW SE 24-5s-14w, added another new oil pool for Posey County. On initial tests the well pumped at the rate of 235 bbl. of oil daily from the Palestine sand at 2,004-22 ft., total depth. Four new operations are now under way in this area,

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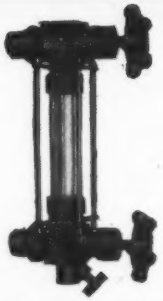
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No. 2—17½ lbs. (2 swivels) ½" and 5/8" chain

STEEL CONSTRUCTION WIRE STRETCHERS
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No. 33—3 Pulleys, roller bearings, ⅝" rope
No. 4—4 Pulleys, plain bearings, ⅝" rope
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which is approximately 1 mile east of the Mink Island area of the New Harmony pool.

Indiana completions during the past week reached their highest level for several weeks. Fourteen completions were reported, which included eight oil wells and six dry holes. Only wildcat completion was the Posey County pool opener. New operations also reached a high level with 15 new starts reported. Included in the new operations were two wildcats, one each in Gibson and Greene counties.

OKLAHOMA

Lincoln and Pottawatomie Counties Get New Pools

At least two new oil pools were discovered in Oklahoma during the past week and favorable shows were encountered in another well. The first of the pools was found in the Chandler area of Lincoln County by Fred Morgan 1 Cash, NE NE SW 6-14n-4e. This wildcat was drilled to the Red Fork sand at 4,305-10 ft. and pipe was set. Following a nitro shot in the Skinner sand at 4,210-20 ft., sand logged at 4,206-22 ft., the well was swabbed at the rate of 5 bbl. of oil an hour. Packer was then set and pipe was perforated opposite the Oswego with 10 shots at 3,918-28 ft. and 12 shots at 3,932-43 ft., and 2,000 gal. of acid applied. The well then flowed at the rate of 10 to 12 bbl. of oil an hour. The Oswego was logged at 3,912-52 ft. Operators have now shut the wildcat in for tankage and have not yet decided whether to dually complete in the two zones.

The second of the new discoveries was a shallow field in the southern part of Pottawatomie County in the Asher area. Here Tom Berry 1 Johnson, NW NW SW 27-6n-3e, showed 150 bbl. of oil and 50 bbl. of water from a shallow sand at 1,840-55 ft.

Mid-Continent Petroleum Corp. is drilling ahead at 6,357 ft. after getting a show of oil and gas on a drill-stem test at the 1 Davenport, NE NE NW 28-4n-2w, south of Maysville in Garvin County. On a 30-minute drill-stem test at 6,012-41 ft., recovery was 60 ft. of oil-cut mud with gas bubbles. The crew then cored from 6,041-53 ft. and recovered only dry sand.

Also in Garvin County, Cities Service is testing the 1-B Wallace, NW NW SW 18-3n-1w, ½ mile northeast of a recent discovery well. This well originally showed oil and gas in the first Bromide but found salt water in the second. Operators then backed up and perforated casing at 5,345-65 ft. with 80 shots and at 5,312-28 ft. with 64 shots. After being washed in, the new discovery flowed 543 bbl. of oil, free of water, in 10 hours through various size chokes. Operators have now ordered a 24-hour test.

J. S. Wise et al 1 McNeely, NE NW SE 8-10n-5e, a wildcat test east of Shawnee, northwestern Pottawatomie County, which for a time looked very promising, has proved disappointing. The Simpson formation at 4,710 ft. showed excellent saturation, but on a drill-stem test at 4,756-70 ft. the hole filled with salt water. The well has been shut down for orders.

OKLAHOMA SUCCESSFUL WILDCAT COMPLETIONS

Garvin County: Powers Oil 1 Brown, NW NW SW 27-14n-3e, flowed 1,260,000 cu. ft. gas, sand 3,422-34 ft., TD 4,132 ft.

Lincoln County: L. B. Jackson 1-A Wagoner, NE NE NE 33-17n-6e, flowed 5,000,000 cu. ft. gas, Red Fork 3,015-24 ft., TD.

Oklahoma County: A. R. Jordan 1 Dulaney, SE NE SW 3-14n-1w, flowed 460 bbl. oil in 12 hr., ¼-in. choke, second Wilcox 5,922-51 ft., TD.

Okfuskee County: Wilcox 1 Lewis, SE NE NE 24-12n-9e, flowed 2,800,000 cu. ft. gas, Cromwell 3,180-96 ft., TD 3,936 ft.

Seminole County: Baughman Drilling Co. 1 Caster, NE NE NW 21-9n-7e, pumped 152 bbl. 39-gravity oil, Booch 3,420-39 ft., TD.

OKLAHOMA WILDCAT FAILURES

Cotton County: J. W. Baldwin 1 Dilks, NW NE NE 27-3s-11w, dry, TD 1,561 ft., white sand 1,503 ft.

Jefferson County: Woolsey & Baker 1 Brown, SW SE SE 22-6s-6w, bad hole at 500 ft.

Lincoln County: Creekmore & Rooney 1 Hodges-Holland, SW SW SE 24-14n-5e, dry, TD 3,930 ft., Bartlesville 3,864 ft.

Logan County: Big Chief Drilling Co. 1 Hoffman, SE SE NW 34-15n-1w, dry, TD 6,046 ft., second Wilcox 6,026 ft.

Pawnee County: Turner & Gillespie 1 Sumners, SW SW SW 34-21n-5e, dry, TD 3,792 ft., Bartlesville 3,332 ft.

Pontotoc County: W. A. Dulaney 1 Dyer, SE SW SW 14-4n-6e, dry, TD 1,372 ft., Cromwell 1,340 ft.

Stephens County: Champlin Refining Co. 1 Williford, SE NW NW 13-2s-5w, lost hole at 271 ft.

MISSISSIPPI

Lincoln County Field Gets Large Producer

JACKSON.—A 1,000-bbl. well in the Brookhaven field, Lincoln County, has spurred interest in that area. The new well, Roeser & Pendleton 1 Lonnie Case, NE NE SE 8-7n-7e, had a total of 42 ft. of productive sand between 10,208 and 10,262 ft. Seven-inch casing was set at 10,367 ft. and after electric survey, 324 shots were placed at 10,202-266 ft. On first 24-hour test the well made

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1,048 bbl. of 38.4°-gravity oil through 5/16-in. tubing choke, with tubing pressure of 1,025 lb. During second 24-hour test, it flowed 1,010 bbl. with the tubing pressure declining slightly to 1,000 lb.

Roeser & Pendleton and Superior Oil Co. are reported to have completed negotiations for transfer of holdings in the Baxterville field in Lamar and Marion counties. Superior has farmed out the bulk of its 10,000 acres of undeveloped leases in the area to Roeser & Pendleton for development, with Superior getting a ⅛ override on the working interest and Roeser & Pendleton to keep at least one rig in continuous operation. Much of the acreage involved carries a 60-day drilling clause. Superior will retain 40 acres around each present oil well and 320 acres around each completed gas well. Roeser & Pendleton is to return all undrilled acreage to Superior.

MISSISSIPPI WILDCAT FAILURES

Green County: Humble Oil & Ref. Co. 2 Greene City Board of Supervisors, 16-3n-7w, dry, TD 7,136 ft., salt 7,120 ft.

Jasper County: Harold L. Duck & Atlantic Ref. Co. 1 Masonite Corp., 9-10n-11w, dry, TD 7,934 ft., Wilcox 1,507 ft., Marine Tuscaloosa 7,205 ft.

Southern Oil Production Co. 1 J. E. King, 30-1n-12e, dry, TD 7,299 ft., Marine Tuscaloosa 6,960 ft., Davis sand 7,104 ft.

Lamar County: Amerada Pet. Co. 1 Anton Vesely, 7-4n-15w, dry, TD 9,716 ft., Marine Tuscaloosa 8,743 ft., sand 9,428 ft.

Yazoo County: Raines & Carroll 1 Allgood, 11-10n-2w, dry, TD 7,649 ft., Tuscaloosa 6,722 ft.

FLORIDA WILDCAT FAILURE

Levy County: Sun Oil Co. 1 J. P. Goethe, 31-14s-17e. dry, TD 3,985 ft. in quartzite.

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LA.-ARK.

Delhi Pool Gets Northeast Extension

SHREVEPORT. — Kingwood Oil Co. 1 Willis et al Unit, SW SW NE 13-17n-9e, extended the Delhi pool of Richland Parish to the northeast last week when it flowed 199 bbl. of oil in 24 hours through ⅞-in. choke from perforations at 3,348-53 ft. Name of the producing formation was not immediately determined.

Four miles south of the Delhi field, Sohio Petroleum 1 Leo Rogers, SW SW NE 15-16n-9e, was reperforating at 4,290-94 ft. At last reports only gassy salt water had been recovered. First perforations at 4,199-4,207 ft., produced a flow of salt water, by heads, and dry gas.

In Rapides Parish, Union Producing Co. 1 Belgard, NW NW NW 14-4n-3e, was waiting on orders after testing wash water with a slight amount of gas from open hole at 10,021-34 ft.

ARKANSAS WILDCAT FAILURES

Little River County: K. E. Merren 1 Shaver, NW SW 36-12s-31w, dry, TD 3,022 ft.

Ouachita County: C. A. Lee 1 Morgan, SE NE SW 2-15s-19w, dry, TD 2,312 ft.

NORTH LOUISIANA WILDCAT FAILURES

Sabine Parish: Carter Oil Co. 1 4-L Co., SW SW 27-7n-10w, dry, TD 9,216 ft.

KANSAS

Arbuckle Pool Opened In Ellis County

A NEW oil pool has been opened in Ellis County by the Mazda Oil Co. 1 Henderson, SE NE 22-11-18w, 1½ miles southwest of production in the Burnett pool. Following acid treatment at 3,616-36 ft. in the Arbuckle lime, the well swabbed 50 bbl. of oil an hour.

The Eldorado Refining Co. 1 Urban, NW NE NW 21-16-17w, located in the Loretto gas pool of Rush County, has been designated as the discovery well of the Loretto oil pool. The 1 Urban was completed as a gas well in the lower zone several months ago, but was shut in when helium gas was found. It was recently reopened and completed as an oil well in the Lansing-Kansas City lime.

Another Rush County wildcat which is attracting the interest of Kansas operators is the Hildebrande-Watson Drilling Co. 1 Dwyer, SW SW SE 1-19-16w, in the southeastern part of the county. Good saturation was encountered in the Arbuckle and 5½-in. pipe was set to the total depth of 3,625 ft. Testing has not yet started.

Helmerich & Payne, Inc., found a show of oil in the Hunton lime at 3,875-79 ft. at their 1 Williams, SW SW SW 18-25-2w, 8 miles northwest of the Valley Center pool. The Lansing lime was topped at 2,582 ft. and the Mississippi at 3,403 ft. Operators will drill ahead to the Arbuckle, expected a few feet below the Hunton, before making a test.

Activity in Kansas oil fields stepped up its pace during the past week with 41 new wells started, compared to 29 for the previous week. Barton County has six of the week's locations, while there were three each in Butler, Ellsworth, Kearny, Russell and Stafford counties.

Refinery Plans Studied

BRATISLAVA.—Construction of at least one oil refinery and possibly two are part of the postwar industrial plans for Slovakia.

SUMMARY OF MAY COMPLETIONS

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	124	62	187	0	*62	0	124	0	0	0	173,436	156
Pennsylvania	300	162	476	7	†131	21	253	26	0	0	447,213	231
West Virginia	42	4	14	30	8	1	22	14	5	0	115,310	79
Ohio	119	32	833	50	37	16	40	61	2	0	320,296	201
Indiana	26	18	1,972	0	8	1	23	2	0	0	50,960	72
Kentucky	42	21	2,143	14	7	9	19	14	0	0	79,800	53
Illinois	149	98	11,952	0	51	7	62	80	0	0	367,006	219
Michigan	80	27	4,334	6	47	6	40	32	2	0	182,454	116
Kansas	188	103	32,691	16	69	0	9	178	1	0	622,628	226
Neb., Mo., Iowa	4	0	0	0	4	0	2	2	0	0	10,395	11
Oklahoma	219	131	19,450	17	71	19	49	116	34	1	741,306	497
Texas	671	396	110,135	30	245	46	152	227	224	22	2,931,944	961
North	205	109	22,549	0	96	44	76	59	26	0	536,488	180
West Central	57	10	2,149	2	45	2	30	25	0	0	139,308	61
West	129	114	61,426	0	15	0	15	58	50	6	659,758	269
Panhandle	20	9	763	7	4	0	6	14	0	0	59,938	71
Eastern	67	43	10,823	11	13	0	9	30	28	0	341,319	123
Upper Gulf Coast	58	31	3,366	3	24	0	2	7	40	9	423,075	83
Lower Gulf Coast	95	67	8,351	4	24	0	0	18	72	5	617,904	111
South	25	10	555	2	13	0	8	12	5	0	86,892	31
South Central	15	3	153	1	11	0	6	4	3	2	70,262	32
Louisiana	126	80	14,700	8	38	1	21	40	47	17	733,865	157
Northern	79	46	8,063	7	26	0	21	36	22	0	326,864	66
Southern	47	34	6,637	1	12	1	0	4	25	17	406,991	92
Arkansas	16	9	1,239	0	7	0	5	8	3	0	58,079	26
Mississippi	22	14	3,534	1	7	0	1	4	12	5	152,549	43
Ala., Ga., Florida	4	2	305	0	2	0	0	3	0	1	421,745	15
Montana	22	7	419	4	11	4	11	6	1	0	52,359	73
Wyoming	11	9	1,373	0	2	0	2	7	1	1	48,540	69
Colorado	9	6	3,329	0	3	0	1	1	6	1	56,832	59
New Mexico	25	16	9,962	1	8	1	4	14	6	0	90,541	94
California	137	105	29,621	8	24	2	49	53	27	6	525,137	203
Oregon	1	0	0	0	1	0	0	0	1	0	9,263	1
Washington	1	0	0	0	1	0	0	0	1	0	6,230	0
Total May	2,338	1,302	263,369	192	844	134	889	888	373	54	8,197,888	3,562
Total April	2,184	1,236	224,661	188	760	102	898	814	322	48	7,240,993	3,619

Service wells, five weeks ending June 1, 1946: *62, †131

CALENDAR OF EVENTS

June

Houston Nomads, Old College Inn, Houston, June 24.

American Society for Testing Materials annual meeting, Buffalo, June 24-28.

American Petroleum Institute, board of directors, Adolphus Hotel, Dallas, Tex., June 25.

Pennsylvania Grade Crude Oil Association, twenty-third annual meeting, William Penn Hotel, Pittsburgh, June 27-28.

July

Los Angeles Nomads, annual meeting and party, Mayfair Hotel. July 10.

Houston Nomads, Old College Inn, Houston, July 29.

August

Interstate Oil Compact Commission, quarterly meeting, August 8-10, Grand Rapids, Mich.

Houston Nomads, Old College Inn, Houston, August 26.

American Institute of Chemical Engineers, western convention, Palace Hotel, San Francisco, August 25-28.

September

Sixth annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., September 9-11.

American Chemical Society, semiannual meeting, Chicago, September 9 to 13.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 10-12.

Fourth National Chemical Exposition, sponsored by Chicago section, American Chemical Society, Coliseum, Chicago, September 10-14.

Los Angeles Nomads, Mayfair Hotel, September 11.

National instrument conference, sponsored by Instrument Society of America, William Penn Hotel, Pittsburgh, September 16-20.

National Petroleum Association, forty-fourth annual meeting, Hotel Traymore, Atlantic City, N. J., September 18-20.

Houston Nomads, Old College Inn, Houston, September 30.

October

American Association of Oilwell Drilling Contractors, sixth annual meeting, Plaza Hotel, San Antonio, Tex., October 1-2.

American Institute of Mining and Metallurigal Engineers, Petroleum Division, annual meeting, Galvez Hotel, Galveston, Tex., October 3-5.

American Gas Association, annual meeting, Atlantic City, October 7-12.

Los Angeles Nomads, Mayfair Hotel, October 9.

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 16-18

American Institute of Mining and Metallurical Engineers, Petroleum Division, annual meeting, Ambassador Hotel, Los Angeles, October 24-25.

Houston Nomads, Old College Inn, Houston, October 28.

Independent Petroleum Association of America, annual meeting, Fort Worth, October 28-30.

November

Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa, November 7-8.

A.P.I. annual meeting, Stevens Hotel, Chicago, November 11-14.

Los Angeles Nomads, Mayfair Hotel, November 13.

Rocky Mountain Oil and Gas Association, annual meeting, November 21-23, Shirley-Savoy Hotel, Denver.

Houston Nomads, Old College Inn, Houston, November 25.

December

American Society of Mechanical Engineers, New York, December 2-6.

Los Angeles Nomads, Mayfair Hotel, December 11.

Houston Nomads, Old College Inn, Houston, December 30.

1947

January

Society of Automotive Engineers, annual meeting and engineering display, Book-Cadillac Hotel, Detroit, January 6-10.

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Among the

Drilling Contractors

Union Rotary Corp. will drill the J. A. B. Oil Co. 1 Leonard Haughton, in NW NW SE 1-11n-7w, Montcalm County, Michigan.

Morris & Meredith, Inc., Houston, contracted to drill Sohio Petroleum Co. 1 Farmers Land & Canal Co., Inc., wildcat test in the Holmwood area of Calcasieu Parish, are running an electrical log to total depth of 9,711 ft. This test is 1½ miles north of Holmwood townsite and is contracted to be drilled 10,500 ft.

Harris Oil Co. has been contracted to drill the S. L. McCall 1 Leroy Christie Community in NE SW SW 36-9n-11w, Kent County, Michigan.

Melton Steinhaus, Elkhart, Ind., is contractor on the Floyd Lee 1 Irvin J. Fisher, in Section 36-38n-5e, in Elkhart County, Indiana.

N. R. Dodd Drilling Co. will drill the Ford Oil Co. 1 Edward & Bessie Pineau in SE NW SE 10-1s-16w, Van Buren County, Michigan.

Jack Caudle, Princeton, Ind., is contractor on the Milton Lebree 1 William Coffman, in NE NE 22-1n-9w, Pike County, Indiana.

Bauman Drilling Co. is rigging up to drill a wildcat, the 1 Wynn, in NE SE SW 26-5n-4w, McClain County, Oklahoma. Location is 2 miles southeast of the North Lindsay discovery well and on a farmout of 100 acres from Mid-Continent Petroleum Corp.

Helmerich & Payne are contractors on the Texas Co. 1 Etchison, in SW SE SW 8-32-1w, Sumner County, Kansas. Location is a mile south of the Wellington pool.

American Drilling Co. holds the contract on the American Drilling Co. and Michigan Oil Co. 4 N. B. Bradley & Sons Trust et al, in SW NW NE 23-19n-4e, Arenac County, Michigan.

Turner Drilling Co. has contracts for two tests in Isabella County, Michigan, to be drilled by Cities Service Oil Co. These are the Samuel T. Down Comm. 1-Gas Unit, in SE NW NW 33-16n-3w, and the Johnson-Methner 1-Gas Unit, in SE NW SW 33-16n-3w.

Harbar Drilling Co. is drilling, the Ed Swearer 1 Deal, in NE NE SW 25-18-37w, rank wildcat in the far western part of Kansas, in Wichita County. Well was drilling below 1,400 ft.

Goll, Graves & Mechling are contractors on the Basin Oil Co. and Don F. Rayburn 3 Orville B. Peters, in NE NE NE 7-19n-4e, Arenac County, Michigan.

Swain Drilling Co., Gladewater, Tex., has been awarded drilling contract on the Calumet Refining Co. 3-B Standard Stiles, in Caddo Parish, Louisiana. The 1,000-ft. test will be in Section 33-21n-16w, in the Caddo field.

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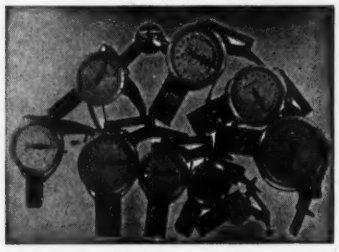

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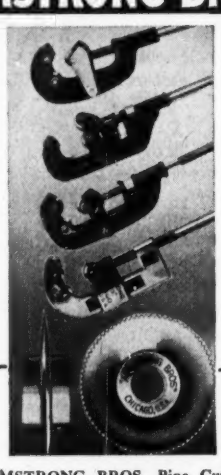

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H & M Drilling Co. has spudded the K & S Oil Co. 1 Kimball in NW SW 3-27-6e, Butler County, Kansas. The test is to be drilled to 3,200 ft.

Max Spidel is contractor on the Arthur J. Boeve 1 Stellkamp and Brandt Comm., in NW NW SE 36-5n-14w, Ottawa County, Michigan.

Pioneer Drilling Co., Mount Vernon, Ill., has been awarded drilling contract on the Carter Oil Co. 1 Augusta Toran, in Section 16-6s-14w, Posey County, Indiana.

Clyde Gibson Drilling Co. has made location for the 1 L. W. McCrory, a 4,800-ft. rotary test 330 ft. from south and west lines of Lot 1, Block 55, ANTCL Survey in Archer County, Texas, and was rigging up.

Ajax Drilling Co. is contractor on the Rockford Paper Mills, Inc., 1 Rockford Paper Mills, Inc., in SE SW NW 1-8n-11w, Kent County, Michigan.

Veedor Supply Co. is drilling the J. H. Fawcett et al 1 McBride, in NW SW SE 31-19-2w, McPherson County, Oklahoma. Location is 2 miles east of the Doorstep pool. Well was drilling below 1,300 ft.

Loffland Brothers has the contract to drill the California Co. 29 Louisiana Delta Farms, in Section 30-16s-23e, Delta Farms field, Lafourche Parish, Louisiana. The test is contracted to 9,500 ft.

R. A. Irwin is contractor on the Lloyd H. Smith 1 William Rees, in Section 23-6s-3w, Allen Parish, Louisiana. The test will go to 7,600 ft. to test the Frio.

Fisher-McCall Oil & Gas Co. is contractor on the W. D. Gannett 1 John Chamberlain, in NE NW SW 17-1s-15w, Van Buren County, Michigan.

Edwards Drilling Co. holds a 7,500-ft. contract on the Pan American Production Co. 25 Laws Realty, in SE SE 25-13s-9e, Point Coupee Parish, Louisiana.

Summit Drilling Co. has been awarded drilling contract on a test that will be drilled by Paul C. Teas and Clark & Cowden just west of the Perry shallow gas pool in Noble County, Oklahoma. It will be a Wilcox sand test.

J. B. Daniels, Tyler, Tex., has the contract for W. F. Glenn 1 E. R. O'Neal, 4,000-ft. wildcat in the northeast corner of 200-acre tract in the Jose Leal Survey, Milam County, Texas.

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Oil Tools
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PERSONALS

Boyle Takes Charge Of Production For Warren

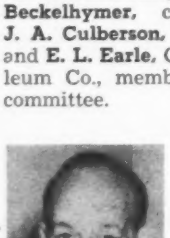
J H. BOYLE, new vice president in charge of oil and gas development and production for Warren Petroleum Corp., has been engaged in the development of various fields in the Mid-Continent and inland Texas areas for some 30 years.

Born in Houston, Boyle moved to Tulsa shortly before the first World War to become auditor for the old Phoenix Refining Co. at Sand Springs, Okla. He was vice president and general manager of the company when it was acquired by the old Chesnut & Smith Corp.

With Chesnut & Smith Corp., Boyle became secretary and was placed in charge of oil and gas production and natural gasoline manufacturing. In 1929, he resigned from Chesnut & Smith to join E. I. Hanlon in the organization of the Hanlon companies. As chief operating executive, Boyle was in direct charge of both natural gasoline manufacturing and oil and gas producing, as well as routine operation of those properties. He assumed his duties with Warren following Warren's acquisition of the Hanlon companies. Boyle's home is in Tulsa.

Dr. C. W. Humphreys, manager of Shell Chemical Corp. plant at Houston, has been named manager of the operations of the plant department. **B. M. Downey** has succeeded Humphreys as manager, and **F. Kortlandt** has become assistant manager. Other Shell personnel changes included **J. G. Bejarano,** to manager of the Dominguez, Calif., plant; **L. M. Roberts** made manager of the engineering department at Wood River, Ill., with **M. R. Sprinkle** assistant manager, and **M. Buck,** manager of engineering; **Galen H. Sturgeon,** geologist at Casper, Wyo., moved to Denver; **Bertric H. Mull,** from Los Angeles office to exploitation engineer at Ventura, Calif.; **S. T. Raycraft,** from Martinez, Calif., to technologist at San Francisco; and **Clarence L. Dunr.,** to assistant department head, physical chemistry, Emeryville, Calif.

Shapleigh G. Gray, consulting geologist, has been elected president of the Houston Geological Society succeeding **Olin G. Bell,** Humble Oil & Refining Co. who will become a member of the advisory committee. Other new officers are **Charles H. Sample,** J. M. Huber Corp., vice president; **A. F. Childers,** Gulf Oil Corp., secretary; **Wayne Z. Burkhead,** Union Oil Co. of California, treasurer; and **R. L. Beckelhymer,** consulting geologist, **J. A. Culberson,** Continental Oil Co., and **E. L. Earle,** Crown Central Petroleum Co., members of the advisory committee.



C. Stribling Snodgrass, former associate director, foreign refining division, Petroleum Administration for War, has returned to the United States after completing a mission as technical consultant for the Brazilian National Council on Petroleum.

Joe C. Darrow has been appointed superintendent of distribution for the Dallas division of Lone Star Gas Co. **L. D. Black,** recently returned from the Army, succeeds Darrow as manager of the Brownwood, Tex., division.

Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Indiana), has been presented a life membership in the Massachusetts Institute of Technology Corp.

M. W. Kibre of General Petroleum Corp. has been nominated president of the California Natural Gasoline Association during the coming fiscal year. **F. J. Colton** of Tide Water Associated Oil Co. has been nominated for vice president. Balloting is now taking place by mail. Present president is **M. L. Arnold,** Richfield Oil Corp.

R. A. Niles has been promoted from assistant superintendent to superintendent of the construction engineering department of the Standard Oil Co. (Indiana) sales department to succeed **Robert Nerem,** who has resigned.

N. E. Baker, chief geologist of Iraq Petroleum Co., Ltd., London, England, is now spending several weeks in the United States. He returned to the New York headquarters of Near East Development Co., American interest in the Iraq company, last week after visiting points in the Southwest. He recently completed a several months visit to the Middle East properties of his company and associated interests. Before joining the Iraq organization 12 years ago he was connected with the geological department of the Standard Oil Co. (New Jersey).

Bruce Claridy, president, and **Lee Burke,** vice president, of Stanolind Pipe Line Co., recently were in Denver preparing to inspect the company's properties in the Rocky Mountain area.

John H. Edahl, production manager for Chapman Oil Co. in Mt. Pleasant, Mich., has been transferred to take charge of the company's new development in Texas. **George Taylor,** former Michigan independent released late last year from the Army, has succeeded Edahl.

Bill Noland, petroleum engineer for Sohio Petroleum Co. in the Michigan production division, has been transferred to the company's Texas district.

Robert Wilkinson, for many years active in Turner Valley oil development, has resigned the position of president of National Petroleums Corp. of Calgary, Alta., and has disposed of his controlling interest in National and associated companies.

Worth C. Gibson, Jr., formerly with British American Oil Producing Co., has joined Houston Oil Co. as district geologist at Shreveport. Another new Houston Oil geologist is **D. D. Utterback,** who has been stationed at New Orleans. Utterback formerly was with The Texas Co.

Dr. Claude Peavy, University of Michigan graduate and formerly chief process engineer for Socony-Vacuum Oil Co., Inc., has been made head of the process design division of Houdry Process Corp. Dr. Peavy has been in process design in catalytic cracking and other refining fields for 17 years. Prior to joining Socony-Vacuum he served as process engineer for 9 years with E. B. Badger & Sons Co.

J. E. Seebold, Nathan Fragen, and **B. H. Shoemaker,** were appointed assistant directors of research this week by Standard Oil Co. (Indiana). Fragen became assistant director in charge of pilot plant development work; Seebold was made assistant director in charge of process design and exploratory economics; Shoemaker was placed in charge of laboratory research on the production of chemicals from petroleum. At the same time, the company named two new section leaders, **R. A. Steel,** in charge of process design, and **A. L. Conn,** in charge of pilot plants. **W. L. Webb** was made assistant executive director of the Whiting, Ind., research laboratories, and **O. L. Hurley** was named to succeed Webb as assistant to the general manager of research. **R. J. Austin** was promoted to group leader. **J. H. Forrester,** associate director of research, was transferred to the manufacturing department of Stanolind Oil & Gas Co., and **R. C. Gunness,** associate director of research, designated to take over Forrester's duties.

Dr. Carl A. Moore has resigned from the geological staff of Carter Oil Co. at Oklahoma City to become assistant geologist of Oklahoma Geological Survey and instructor in the school of geology at University of Oklahoma.

William E. McIntosh, Jr., Joe Borden, Carl Nelson, and **J. L. Morris** have been assigned to Pure Oil Co.'s geological department at Billings, Mont. McIntosh and Borden were transferred from Pure's southwest producing division, and J. L. Morris from the Texas division at Fort Worth. Other transfers to the Rocky Mountain department are **W. L. Dockery,** from the Texas division, and **Robert L. Painter** from the Illinois division, both to the Jackson, Wyo., region.

E. A. Wahlstrom has been placed in charge of all production operations of Gulf Oil Corp. in the Fort Worth district, succeeding **M. O. Rife,** who retired. Wahlstrom was a former director of production in District 3 of Petroleum Administration for War.

G. SOWARDS

George Sowards, assistant to the chief petroleum engineer since February 1942, has been appointed chief petroleum engineer of Ohio Oil Co. to succeed **James D. Wheeler** who was recently appointed manager of the Grand Rapids, Mich., division. **W. B. Berwald,** petroleum engineer of the Tulsa division since February 1939,

R. A. HOCKENSON

W. B. BERWALD

has been promoted to assistant chief petroleum engineer of the company. Berwald will be headquartered at the general office in Findlay, Ohio. **Ralph A. Hockenson,** a member of the petroleum engineering staff at Tulsa, has been promoted to division petroleum engineer to succeed Berwald.

G. N. Anderson, assistant district superintendent of the Talco (Texas) district in Humble Oil & Refining Co.'s production department, has been promoted to district superintendent, succeeding **V. O. Harris,** who has been transferred to the Mt. Sylvan district at Grand Saline, Tex. Other recent changes among supervisory personnel in Humble's production department:

James H. Galloway, Scott and Hopper district superintendent, Encino, Tex., transferred to the Means district, Florey, Tex.

John G. Calvert, transferred from the East Texas division office, Tyler, to the London district, Overton, Tex., and promoted to district petroleum engineer.

Tom E. Beaird, London district petroleum engineer, Overton, transferred to the Hawkins district, Hawkins, Tex.

Charles S. Yust, transferred from the East Texas division office, to the Mt. Sylvan district and promoted to district petroleum engineer.

J. B. Alexander, transferred from the East Texas division to the Southwest Texas division, Corpus Christi, as division civil engineer. He will replace **J. M. Carter,** who is resigning.

R. L. Pinion, Jr., transferred to the East Texas division as office civil engineer. He has been district civil engineer in the Galveston Bay district, Dickinson, Tex.

E. T. Shahan, new district civil engineer at Dickinson. He is transferring from the East Texas division.

Monroe R. Wolters, promoted from office civil engineer to assistant division civil engineer in the East Texas division.

Charles M. Sherfesee, transferred from the East Texas division office to the Mt. Sylvan district and promoted to district civil engineer.

Everett C. Clark, Jr., civil engineer, promoted to district civil engineer, Lovell Lake district, Beaumont.

George Howells has been elected chairman of the Taft chapter of the California Natural Gasoline Association. Howells, a member of Tide Water Associated Oil Co.'s San Joaquin Valley staff, served as secretary last year. **Harmon Peel,** of Southern California Gas Co. at Taft. was elected secretary-treasurer.

H. B. Johnson, general superintendent of operations of Haynesville (La.) unitized field since May 1944, has been named general manager of the Haynesville Operators Committee. He succeeds **J. R. Butler** who resigned June 1 to become vice president and general manager of the newly organized Old Ocean Oil Co. which recently purchased the interests of J. S. Abercrombie Oil Co.

ROLLIN ECKIS

Rollin Eckis has been appointed chief geologist of Richfield Oil Corp., succeeding **Harold W. Hoots** who recently resigned to enter the consulting field. Eckis has been assistant chief geologist of Richfield for the last several years.

R. B. Wrixon has resumed his new duties in Bogota, Colombia, as assistant to **G. C. K. Dunsterville,** assistant manager of Shell Oil Co. of Colombia, Ltd. Another member of Shell's Colombian organization, **A. C. Buchan,** chief mechanical engineer, has returned to Colombia after a vacation in Scotland. **K. Wiley,** of Shell's London production department, is visiting in Bogota.

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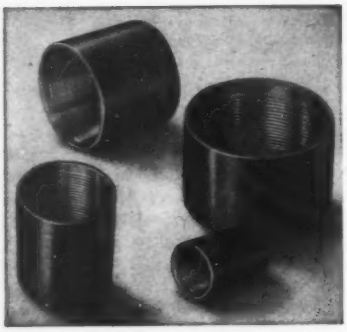

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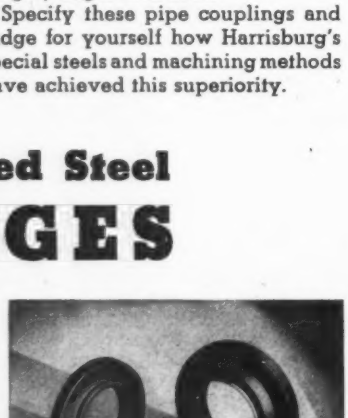

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Equipment Men in the News

Dodge Named Chairman Of Air Products, Inc.

Henry W. Dodge, former vice president and general sales manager of The Texas Co., has been elected chairman of the board of Air Products, Inc., with New York offices at 50 Broadway. Dodge joined the War Production Board in Washington shortly after Pearl Harbor. He resigned as deputy director general of the board in February 1943 and became director of Petroleum Administration for War for the 17 eastern states.

New Company Organized

The Fish Engineering Corp., specializing in the design, engineering, and construction of all types of process plants for the gas, oil, and chemical industry, has been organized at Houston. Members of the corporation include Ray C. Fish, C. B. Ames, A. J. L. Hutchinson, R. D. Ricketts and O. L. Mullen. Offices are at 1014 M & M Building.

New Company Formed

Emil Geppelt and C. F. Tears have announced organization of Process Engineers, Inc., with offices at Dallas. Arrangements have been made with Texaco Development Corp. to design and construct propane deasphalting,. furfural treating, and M.E.K. dewaxing processes as licensed by Texaco.

Geppelt was associated with Continental Oil Co. for 2 years and then joined Graver Corp. in Chicago. Later he operated as a consulting engineer in the design and construction of oil refineries for a period of 10 years. He joined American Liberty Oil Co. as vice president in charge of refining in 1941.

EMIL GEPPELT

C. F. TEARS

Geppelt and Tears organized the Process Engineers, Inc., in February 1946, and have made arrangements with the Texaco Development Corp. to design and construct propane deasphalting, furfural treating and M.E.K. dewaxing processes as licensed by Texaco Development.

Tears, a chemical engineer, has been identified with both the chemical and petroleum industries for the past 29 years. He started in the design of chemical plants with Walter E. Lummus Co. and later was associated with Continental Oil Co. He recently resigned his position with the Celanese Corp. of America.

Wise Opens Sales Office

Max R. Wise has opened an office in Tulsa at 1006 Hunt Building as sales engineer and representative of General Metal Products Co. and St. Louis Steel Castings Co. The former company specializes in heavy and light and deep or shallow stampings of specified materials. In addition it does fabricating, assembly, and die work. The St. Louis Steel Castings Co. specializes in carbon and low-alloy steel castings such as are used in well head fittings, hoisting equipment, rock bits, valve bodies and miscellaneous industrial castings.

Miller Joins Lane-Wells

J. Ralph Miller, for the past 10 years with Halliburton Oil Well Cementing Co., has joined Lane-Wells as district sales engineer at Shreveport, according to Lane-Wells general sales manager, James D. Hughes.

Bayless Named Service Engineer by Edward Valves

D. O. Bayless, Houston, has been named special factory service engineer for southwestern United States by Edward Valves, Inc. He will headquarter in Houston, servicing Edward users throughout the Southwest and assisting sales representatives on specific projects.

S. M. Jones Elects Officers

The following slate of officers to head up The S. M. Jones Co., Toledo and Tulsa, was elected at the recent annual meeting of the board of directors: Mason B. Jones, president; Francis S. Oatman, treasurer; Edward G. Kirby, secretary, and Frank E. Stoll, assistant secretary.

Naylor Heads Houston C. of C.

C. E. Naylor, president, Maintenance Engineering Corp., Houston, was named president of the Houston Chamber of Commerce at a recent meeting of the board of directors.

Parker Names Division Head

Appointment of Robert H. Davies, formerly manager of technical service for The Parker Appliance Co., Cleveland, to head a new engineering division which will combine the previously separate functions of product development, product engineering, and technical service, is announced by S. B. Taylor, company president.

Emmett C. Hartley, who has directed Parker's research and product design activities, becomes manager of a new special products division which has been established to handle the manufacture and sale of rubber and plastic products.

Leland H. Schmohl, a Parker veteran of 16 years, will continue direction of product development in the new engineering division as chief design engineer.

Hall Elected Vice President

A. P. Hall has been elected vice president of American Chain & Cable Co., Inc., Bridgeport, Conn. Before joining the company in 1944, he had been in the steel industry for 22 years. He will continue his present duties as general manager of sales, and his headquarters will remain at 230 Park Avenue, New York City.

Enterprise Appoints Everett

Appointment of W. S. "Bill" Everett, former lieutenant commander in the Office of Inspector of Naval Materiel, as sales engineer is announced by Enterprise Engine & Foundry Co. His background includes several years of machine design, petroleum-plant installation and general plant engineering, with Standard Oil Co. of California and Colgate-Palmolive-Peet Co.

Lorraine and Apco Merge

Merger of Lorraine Corp. and Apco Manufacturing Co. into Lorraine, Inc., has been announced by David G. Lorraine, president of the new organization. Plant is located at 11510 South Alameda Street, Los Angeles, which with the recent addition of the modern facilities of Apco, is one of the best equipped factories in the oil-tool industry.

Ladish Names Ad Manager

Ladish Drop Forge Co., Cudahy, Wis., announces the appointment of C. R. Standen as advertising manager. Prior to the war, Standen was associated with the RCA Victor Division of Radio Corp. of America in Camden.

District Manager Named

Frederick H. Meyers has been named manager of Republic Flow Meters Co.'s Cincinnati district which includes Central and Southern Ohio and Eastern Kentucky. The company also announces removal of its branch office from the Carew Tower to the Boesch Building, Cincinnati.

Two Representatives Placed

Joe Castles, a representative of American Iron & Machine Works Co. for the past 2 years in the Mississippi-South Louisiana territory, has been transferred to Casper, Wyo., to cover the Rocky Mountain area.

Harry K. Conley, who has just completed terminal leave as a lieutenant in the Navy after 4 years' service, has joined the sales staff of American Iron & Machine Works Co., and will take over the Mississippi-New Orleans territory, with headquarters in Natchez.

Ethyl Corp. Shifts Two

Appointment of H. Claire Dees as manager of the Seattle division of Ethyl Corp. to succeed Harry Kuhe, and transfer of

H. C. DEES

HARRY KUHE

Kuhe to become manager of the Chicago division, are announced by J. Coard Taylor, vice president in charge of sales. Dees, formerly manager of the Baltimore division, returns to Ethyl after 3½ years with the Army Air Corps.

Kuhe after 3 years of service as a field representative in Chicago, became assist-

ant division manager in Tulsa in 1932, and in 1940 he was appointed manager of the Seattle division.

New Assistant Vice President For ACF Appointed

Announcement is made by American Car & Foundry Export Co. that W. H. Waters has been appointed vice president. Waters has been connected since 1940 with the ACF purchasing department as liaison man between the company and the U. S. Ordnance Department.

Gulick to Represent Titan

Titan Metal Manufacturing Co., Bellefonte, Pa., announces the appointment of J. A. Gulick as sales representative for Oklahoma, Arkansas, and northwestern Texas, with offices at 310 Thompson Building, Tulsa.

Continental Announces Changes

W. O. TIMBERLAKE

Continental Supply Co. recently announced three management changes in its sales organization. W. O. Timberlake has been named assistant district manager of the Oklahoma-Kansas district. He will head the Oklahoma division with headquarters in Oklahoma City. F. B. Collett has also been made assistant district manager of the same district and will be located in Wichita, responsible for the Kansas division.

Both of these offices are under the supervision of R. A. Brewer, district manager, Tulsa.

F. B. COLLETT

G. A. STOUT

Announcement was also made of the opening of an office in Denver, with George A. Stout in charge. Location of the office is the U. S. National Bank Building, and it is under direct supervision of J. R. Chapman, district manager at Casper.

Torrence Rejoins Link-Belt

William C. Carter, president, Link-Belt Co., announces that George P. Torrence will again become associated with Link-Belt Co. Torrence will rejoin Link-Belt as executive vice president, and will become president of Link-Belt Co. November 1, 1946, at which time Carter retires.

The board created an executive committee consisting of directors Howard Coonley, Russell Livermore, and W. C. Carter with Carter as chairman.

Torrence was with Link-Belt from 1911 to 1936, when he resigned as president. He has been in Cleveland since 1936 as vice president and general manager of The Rayon Machinery Corp., a subsidiary of The Industrial Rayon Corp., and as president of The Cleveland Pneumatic Tool Co.

Reese Named Parker Sales-Application Engineer

HENRY M. REESE

Appointment of Henry M. Reese, formerly superintendent of the Valve and Bender Division of The Parker Appliance Co., Cleveland, as special field sales application engineer, is announced by Fred E. Amon, general sales manager. Reese will continue to make his headquarters in Cleveland but will devote all of his time to consultation on valve and fitting problems of major industries, including chemical process, power plant, refining, machine tool and refrigeration.

Bethlehem Supply Co. Expands

C. C. Crider, southern division manager for Bethlehem Supply Co. at Tulsa, announces the opening of an additional store in Carthage, Tex. Personnel includes W. Q. "Bud" Mitchell, store manager and field representative, R. A. Blair and W. H. McDonald, floormen.

Bethlehem also announces it has moved to new location in Shreveport. The new store is located at 403 North Market Street. Personnel consists of D. G. Silvey, store manager and field representative; M. W. Bass, special representative; F. E. Bennett, field representative; D. L. Wellons, field representative, and G. H. Huffhines, engineering representative.

V. W. Bailey, northern division manager, with headquarters in Tulsa, announces that Bethlehem is now ready to serve the oil industry in southern Oklahoma from its new store at Lindsay. Personnel is M. L. Gilbert, store manager and field representative; C. E. Ridley and P. H. Howard, floormen. All of these men are returned veterans. This store is under the direct supervision of W. T. Davis, district manager, Oklahoma City.

Personnel Changes Announced

O. M. Havekotte, president of International Derrick & Equipment Co., has announced personnel changes that affect the company's California division. L. R. Wells has relinquished his duties with the California division to accept new responsibilities in the East. J. D. McEwen becomes vice president and general manager of the California division, and will be responsible for all operations and engineering at the Torrance plant.

Responsibility for domestic and export oil-well sales on the Pacific Coast has been given to G. W. Walton, vice president, machinery and export oil-well sales, in addition to his other duties.

The company is transferring its sales offices at Los Angeles to the plant at Torrance.

New Bowser Appointments

R. L. LEDBETTER

Robert L. Ledbetter has been appointed supervisor of oil-field-equipment sales with headquarters in Dallas, according to an announcement made by Fred C. Farmer, manager, meter sales division, Bowser, Inc., Fort Wayne. Prior to his association with Bowser, Ledbetter was a petroleum and meter engineer in the southern oil fields for more than 15 years. Carlos E. Crawford, who recently joined the Bowser organization, has assigned to the company full patent rights on a new, simplified gas trap valve for oil wells. He will assist Ledbetter with headquarters in Wichita Falls.

Other representatives who will work with Ledbetter are: R. K. Franklin, Houston; C. G. Rose, Oklahoma City; L. E. Pietzker, Dallas; E. O. Johnson, St. Louis; F. C. Enz, Evansville.

Wagner Heads Jarecki Sales at Tulsa

Jarecki Manufacturing Co. recently announced appointment of Karl G. Wagner as district manager in charge of sales at Tulsa. Wagner started with the Jarecki Manufacturing Co. in Bartlesville in 1937 and was transferred to Seminole in 1939 as store manager and moved to Tulsa as city salesman in February 1942.

Kimball Heads Sales Department

Charlie "Tutsie" Kimball has been made sales manager of Louisiana Supply Co. The company also announces opening of branch store at Mamou, La.

Stevenson Gets New Post

Announcement is made that at the recent meeting of the board of directors of American Car & Foundry Co., Frederick A. Stevenson, president of the company, was elected a member of the executive committee.

Moore Joins Kerr

Kerr Engineering & Construction Co., Kilgore, Tex., announces the appointment of J. B. Moore, Jr., who is placed in charge of a new department of civil engineering, offering service in survey, topography and road, and earthen-reservoir construction. Moore was formerly civil engineer with Tide Water Associated Oil Co.

Hughes Joins Western Supply

JAMES E. HUGHES

Western Supply Co., Tulsa, recently announced through its president, F. Wilson Dye, the appointment of James E. Hughes to the position of chief engineer for that company. Hughes will also be in direct charge of Western's heat-exchanger sales. Hughes comes to Western from the chemical products department of Phillips Petroleum Co., where he became experienced in patent licensing as a member of the Perco division.

U. S. Rubber Appoints

Dr. Sidney M. Cadwell has been appointed director of research and technical development of United States Rubber Co. Formerly assistant general manager of the company's tire division, Dr. Cadwell brings to his new position 27 years of administrative and science experience in the fields of rubber and plastics.

Dr. Willis A. Gibbons, who has been serving as director of research and technical development for the company, becomes associate director. He will devote his entire time to scientific research.